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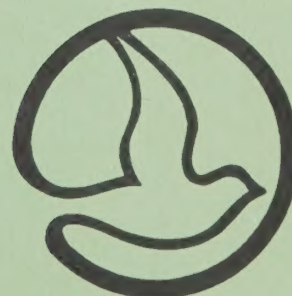
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1988 REVISION TO THE
AIR QUALITY MANAGEMENT PLAN

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SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT



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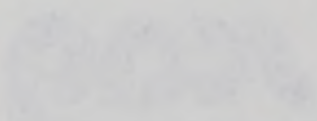
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UNIVERSITY OF CALIFORNIA

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

**Draft
Environmental Impact Report
1988 Revision to the
Air Quality Management Plan**

SCH No. 88021022

**James M. Lents, Ph.D.
Executive Officer**

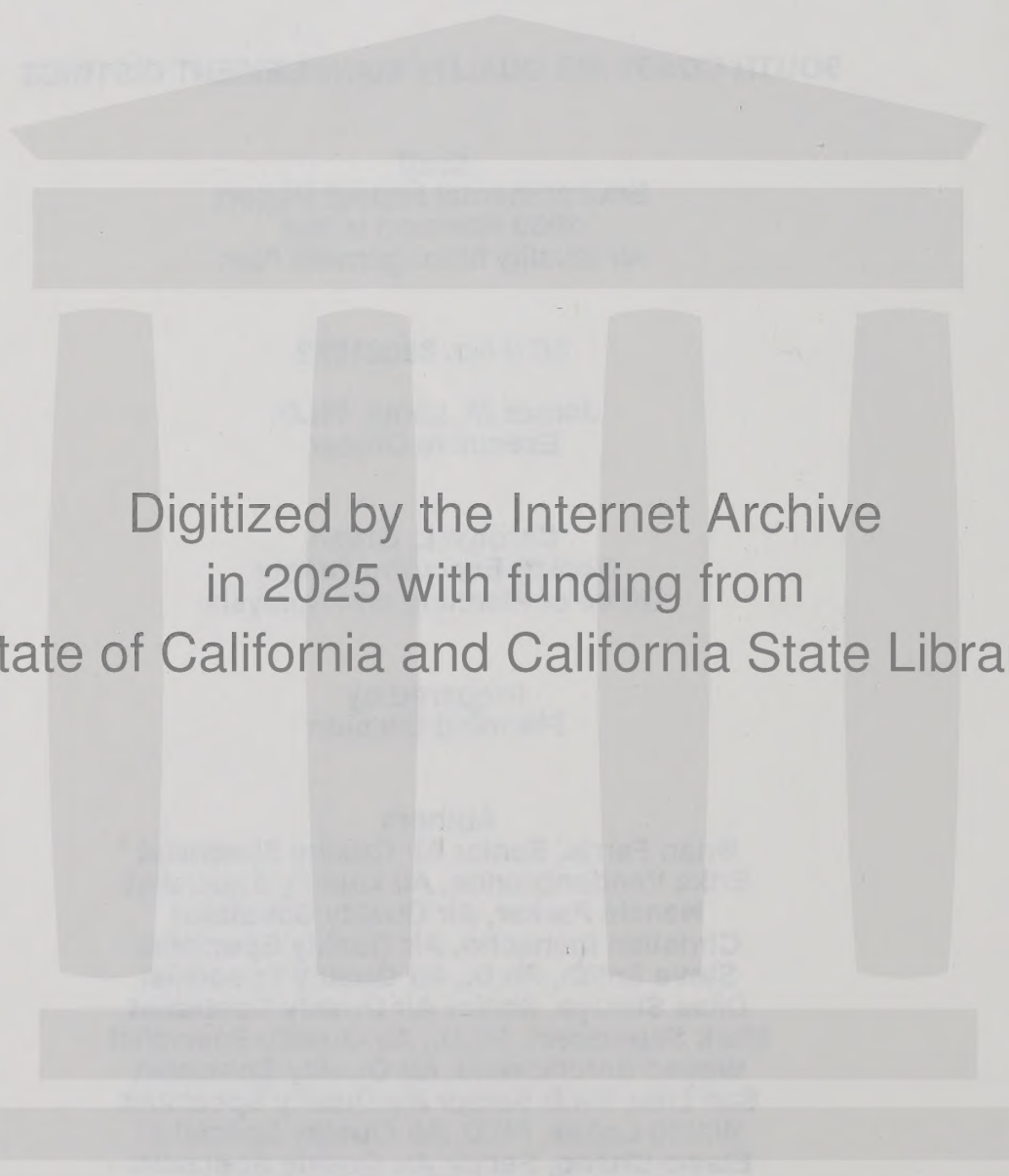
**Carolyn L. Green
Deputy Executive Officer
Office of Planning and Analysis**

**Prepared by
Planning Division**

Authors

**Brian Farris, Senior Air Quality Specialist
Erika Vandenbrande, Air Quality Specialist
Nancie Parker, Air Quality Specialist
Christian Ihenacho, Air Quality Specialist
Steve Smith, Ph.D., Air Quality Specialist
Ditas Shikiya, Senior Air Quality Specialist
Mark Saperstein, Ph.D., Air Quality Specialist
Wayne Barcikowski, Air Quality Specialist
Sue Lieu, Ph.D., Senior Air Quality Specialist
Waldo Lopez, Ph.D., Air Quality Specialist
Elaine Chang, Senior Air Quality Specialist
Robert Kneisel, Ph.D., Consultant
Carla Walecka, Consultant
ERT, Consultant**

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CHAPTER 1

SUMMARY

Introduction

Project Description

Summary of Areas of Controversy

Project Alternatives

Project Benefits

INTRODUCTION

The South Coast Air Basin has one of the most pronounced air quality problems in the nation. Of the standards established for six criteria air pollutants in order to protect public health, the Basin currently complies with only the lead and sulfur dioxide standards. Monitored ozone levels are nearly three times the national standard, carbon monoxide and fine particulate (PM₁₀) levels are nearly twice the national average, and the Basin is the only area in the nation that still exceeds the nitrogen dioxide standard (SCAQMD, 1987a).

The purpose of the Air Quality Management Plan (AQMP) is to provide a regional plan to bring the Basin into attainment of federal and state air quality standards. This 1988 Revision to the Plan proposes measures which would reduce criteria air pollutant emissions to federal standards by 2007. The South Coast Air Quality Management District (District) and the Southern California Association of Governments (SCAG) are the two agencies responsible for jointly developing the AQMP. The District is the agency responsible for enforcing air pollution reduction rules and regulations in the Basin.

PROJECT DESCRIPTION

The 1988 Revision to the Air Quality Management Plan is being developed pursuant to the direction of the District Governing Board and SCAG's Executive Committee. The AQMP is intended to serve as a regional guidance document that would enable the Basin to attain federal emission standards for criteria pollutants by the year 2007. The Plan contains three tiers of measures that would reduce emissions from both stationary source and mobile sources. Tier I measures could be adopted within the next five years; Tier II measures rely on significant advancement of current technologies and regulatory intervention; and Tier III measures require development of new technology. The major provisions of the AQMP are described below.

Tier I Measures

Maximize the reduction in the use of pollutant-emitting materials;

Maximize the substitution of non-polluting or less-polluting materials;

Maximize the use of most efficient control devices;

Maximize the compliance and maintenance programs for fugitive emissions;

Maximize the efficiency of the existing transportation infrastructure to provide less polluting forms of transportation;

Maximize the effectiveness of existing measures through improved administrative practices; and

Maximize strong, public and private commitments for the required implementation actions.

Tier II Measures

Extend current technological applications beyond levels traditionally pursued;

Introduce active regulatory intervention through technology-forcing standards or emissions charges; and

Develop strong, enforceable public and private commitments for the required implementation actions.

Tier III Measures

Further alter solvents and coatings in industrial, commercial, and residential applications; and

Further reduce the remaining petroleum based fuel use in industrial and on-road and off-road mobile applications.

SUMMARY OF AREAS OF CONTROVERSY

Both the positive and negative impacts of the Air Quality Management Plan will be broad in scope; affecting individuals, businesses, and industries. Significant human health benefits will be realized from attainment of the ambient air quality standards. Improved crop yield, and decreased building and materials damage are also expected to be significant positive benefits resulting from the Plan.

In those instances where adverse impacts are anticipated, mitigation measures can be used to help alleviate these negative impacts. In a few instances, significant impacts that cannot be mitigated to insignificance are expected to occur. The following areas were initially identified as areas that may experience negative impacts if the AQMP is adopted. These topics are included here only as summaries of the important issues. Each issue is discussed in more detail in Chapter 4.

Economic and Socioeconomic Impacts

Implementation of the AQMP will hasten regional economic trends; affecting individuals, businesses, and industries. Shifts in the types of businesses and industries located in the Basin may also be made more rapidly. Furthermore, the lifestyles of Basin residents are expected to evolve rapidly to meet the challenges of the 21st century.

Electrification

Shifts from fossil fuel use to electrical power are also expected through electrification of industrial processes, urban mass transit systems, rail line haul operations, ship berthing facilities, passenger vehicles, and light- and medium-duty trucks. Although demand for electricity will increase, more efficient appliances, industrial processes, and load management and conservation techniques would be used to help limit the impact on the demand for electricity. Electricity that cannot be generated in-Basin by non-polluting sources such as fuel cells, solar, and wind power will be provided by generating facilities located outside the Basin.

Water Impacts

Although several of the control measures would require increased water use to suppress dust, the use of non-potable water could reduce the impacts on the water supply. Alternative fuels and control equipment designated as Best Available Control Technology (BACT) could also affect the water supply in the event of a spill or leak.

Energy Impacts

As the industrial and transportation sectors shift to cleaner, less-polluting fuels, the demand for both electricity and natural gas are expected to increase. However, increased demand for these energy sources can be mitigated in part through conservation measures, load management techniques, and more efficient appliances and processes.

On a more macroscopic scale, increased demand for methanol as an alternative fuel and for ammonia used in Selective Catalytic Reduction equipment inside the Basin may also affect future energy resources outside the Basin because both methanol and ammonia are produced using either coal or natural gas as a feedstock.

Impacts of Methanol Fuel

Significant air quality improvements could be achieved by substituting alternative fuels for fossil fuels. Methanol is a likely substitute because it is significantly less reactive in the atmosphere. However, market dynamics and the need to develop an efficient distribution infrastructure may affect the implementation schedule called for in the AQMP.

Possible environmental impacts include increased carbon monoxide and hydrocarbon emissions due to incomplete oxidation resulting from methanol's lower combustion temperature. Formaldehyde emissions may also increase during methanol combustion, which may create worker health impacts. Also, because approximately twice the volume of methanol as gasoline, diesel fuel, or fuel oil is required to provide an equivalent amount of energy, significantly greater amounts of methanol would have to be transported into the Basin. Therefore, there are potential environmental impacts and community health issues that must be addressed in cases-of accidental spills during transport.

PROJECT ALTERNATIVES

The California Environmental Quality Act (CEQA) requires that an environmental impact report (EIR) contain a reasonable range of alternatives to the proposed project. Any alternatives should include realistic measures for attaining the basic objectives of the project and provide a means for evaluating the comparative merits of each alternative. The specific alternative of "no project" must also be evaluated. The range of alternatives required in an EIR are those necessary to permit a reasoned choice, and need not include every conceivable project alternative (Denney, et al., 1988). Therefore, summarized below are four reasonable alternatives to the AQMP.

No Project Alternative

Under the No Project Alternative, the 1988 Revision to the AQMP would not be adopted in any form. Currently, the 1979 AQMP is the only federally approved Air Quality Management Plan for the region.

Partial Implementation Alternative

The strategies and control measures included in the AQMP would be implemented in part through imposition of Tier I and Tier II measures. However, it is unlikely that the region would attain ambient air quality standards through this strategy.

Additional Emissions Reduction Effort

Emission control efforts beyond those called for in the AQMP would be implemented to allow for a margin of safety. Adverse impacts, particularly those associated with Tier III measures, would probably be greater.

Delayed Compliance Alternative

Under this alternative, the set of measures contained in the AQMP Revision would remain the same. However, implementation of the measures would occur over a longer time-frame --- perhaps 30 to 40 years. Although any immediate adverse impacts of the Plan could be delayed somewhat, increases in population growth beyond the 20 year period assumed in the Plan would result in greater difficulty meeting air quality standards.

ROG Controls Only

A variation on the partial implementation strategy, this strategy would only implement those controls required to control ROG emissions. Again, it is unlikely that federal and state ambient air quality standards could be attained through this strategy.

Alternative Growth Scenario

Under the alternative growth scenario, the control measures contained in the AQMP Revision would be similar, but may require a different level of implementation to accommodate any changes in population growth or geographical distribution. The Southern California Association of Government's Growth Management Alternative 4 (GMA-4) may be used as a basis for this strategy. Although the overall growth in population would not change, the geographical distribution of where these additional people live and work would be altered. Or, different population growth figures, such as the growth projection developed by the State Department of Finance, may be considered.

PROJECT BENEFITS

The primary purpose of the Air Quality Management Plan is to meet health-based ambient air quality standards by reducing criteria pollutant emissions in order to reduce public health impacts caused by these emissions. In addition, significant improvements in durability and appearance of buildings and materials and improvements in visibility will provide significant benefits. Healthier vegetation and higher crop yields are also significant benefits anticipated by implementing the Plan.

The benefits of the AQMP are diverse and spread across many different economic sectors. The financial benefits resulting from the Plan have not been fully quantified because, particularly in Tiers II and III, specific emission charges, control technologies, and control equipment are not yet available. Preliminary study indicates that these benefits will be significant in magnitude, not only from the health, vegetation, building, and materials impacts, but from positive changes in lifestyle and more efficient use of existing resources.

CHAPTER 2

PROJECT DESCRIPTION

Area of the Project

Historical Context of the AQMP

Objectives of the Project

Description of the Project

Alternatives to the Proposed Project

AREA OF THE PROJECT

The Air Quality Management Plan (AQMP) applies to a 6600 square mile area identified as the South Coast Air Basin (Basin), which contains all of Orange County and the non-desert portions of Los Angeles, San Bernardino and Riverside Counties. The Basin is bounded by the Pacific Ocean on the west, San Diego County on the south, and the San Gabriel, San Bernardino and San Jacinto mountains to the north and east.

The modeling region used in the AQMP also includes portions of Ventura County and the Southeast Desert Air Basin (SEDAB) in San Bernardino and Riverside Counties. Ventura County air quality planning is under the jurisdiction of the Ventura County Air Pollution Control District, which has prepared its own AQMP. The SEDAB portion of San Bernardino County is under the authority of the San Bernardino County Desert Air Pollution Control District. The SEDAB portion of Riverside County is under the control of the SCAQMD, but is not part of the AQMP planning area. An AQMP was prepared for the SEDAB in 1979, and there are no plans to update it at this time.

The use of the larger modeling region shows that the impacts of AQMP implementation extend well beyond the defined South Coast Air Basin. The impacts discussed in this EIR are intended to extend beyond the boundaries of the Basin as well, and the mitigation measures are recommended for those responsible agencies located outside the SCAQMD jurisdiction as well as for those within it.

HISTORICAL CONTEXT OF THE AQMP

In 1976, the Lewis Air Quality Act established the four-county South Coast Air Quality Management District. The Lewis Act also required preparation of an Air Quality Management Plan that would be consistent with federal planning requirements. In 1977, amendments to the federal Clean Air Act established local air quality planning processes for those local areas that had not reached attainment of federal ambient air quality standards. The first AQMP was prepared by the District in 1979. This is currently the only federally approved AQMP for the region.

The AQMP was revised in 1982 to reflect better data and improved modeling tools. However, in 1987 the federal court ordered EPA to disapprove the 1982 AQMP Revision because it did not demonstrate attainment of the federal standards by 1987 as required by the Clean Air Act.

OBJECTIVES OF THE PROJECT

The primary objective of the AQMP is to set forth a comprehensive strategy to attain compliance with both federal and state ambient air quality standards by the year 2007, as set by the District Board in January 1988. Both the federal and state governments have health-based standards for six air contaminants: sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and fine particulate matter. The Basin is currently in compliance with the lead and sulfur dioxide standards, but exceeds the others.

California has set additional standards for ethylene, hydrogen sulfide, sulfates, visibility, and vinyl chloride. All but sulfates and visibility are primarily localized problems, to be handled through District permit requirements. Sulfates and visibility are addressed in the AQMP through control programs for ozone, nitrogen dioxide, carbon monoxide, and fine particulate matter.

This environmental impact report (EIR) is intended to be used as a full disclosure document to the decision maker and other interested agencies and parties on the general environmental impacts of AQMP implementation. The EIR focuses primarily on those impacts that would occur in the Basin as a result of implementing the Plan. However, impacts that would significantly affect resources outside the Basin, particularly through the electrification strategy and out-of-Basin exportation of non-biodegradable waste, have also been addressed.

The EIR also contains proposed mitigation measures for dealing with potentially significant adverse environmental impacts. Mitigation measures for reducing or eliminating significant impacts which are beyond the authority of the District are recommended to the responsible agencies for action under the authority of the California Environmental Quality Act (CEQA).

Finally, this EIR will be used by the District as the base environmental document in a tiered system of environmental analyses on specific District projects such as individual rules and permit actions. It is intended for similar use by other governmental agencies at all levels in considering actions and plans that may affect air quality and in maintaining consistency with the AQMP.

DESCRIPTION OF THE PROJECT

Emission Growth and Reduction Targets

The AQMP contains strategies designed to meet ambient air quality standards in the Basin by the year 2007. Table 2-1 shows the summary of projected baseline air emissions growth from 1985 to 2010, and the AQMP target emission reductions needed to obtain applicable ambient air quality standards.

Table 2-1
Summary of Baseline Emissions
for the South Coast Air Basin
(tons/day)

SOURCE CATEGORY	ROG	NOx	SOx	CO	PM*
<u>YEAR 1985</u>					
Residential/Commercial/Services	280	142	13	82	210
Industrial/Manufacturing	310	144	43	108	1,338
On-Road Mobile Sources	578	619	35	4,751	84
Other Mobile Sources	78	135	30	489	13
Total	1,246	1,040	121	5,430	1,645
<u>YEAR 2000</u>					
Residential/Commercial/Services	294	164	16	74	261
Industrial/Manufacturing	356	90	53	123	1,855
On-Road Mobile Sources	257	477	28	3,006	96
Other Mobile Sources	112	173	36	682	15
Total	1,019	904	133	3,885	2,227
Change from 1985 Emissions	-227	-136	+16	-1,545	+582
<u>YEAR 2010</u>					
Residential/Commercial/Services	322	184	19	65	287
Industrial/Manufacturing	377	87	52	140	2,011
On-Road Mobile Sources	326	570	30	3,938	111
Other Mobile Sources	129	192	38	781	16
Total	1,154	1,033	141	4,924	2,425
Change from 1985 Emissions	-92	-7	+28	-506	+780

*PM emissions from paved road dust are listed under stationary sources.

Emission Reduction Strategy

Three tiers of strategies are identified to meet the emission reduction objectives of the AQMP. These tiers are organized according to increasing level of difficulty and availability and technology in implementation and, in Tier III, are dependent on major technological breakthroughs. These tiers are described as follows:

Tier I - Full Scale Implementation of Known Technology

Tier I strategies call for the aggressive implementation of known technologies in a traditional regulatory framework. Adoption of Tier I measures is intended to be completed within the next five years. The Tier I strategies are designed to reach the following goals:

Minimize the use of pollutant-emitting materials;

Maximize the substitution of non-polluting or less-polluting materials;

Maximize the use of the most efficient pollution control devices for emission control;

Maximize compliance and maintenance programs for fugitive emission control;

Maximize the effectiveness of existing measures through administrative procedures.

Detailed documentation of the control measures is provided in Appendices IV-A and IV-E through IV-G of the AQMP. The emission control measures are organized into two basic types -- stationary source control measures and transportation source control measures. These classes of control measures are further subdivided into the following categories:

Stationary Source Control Measures

Surface Coating and Solvent Use -- including use of low-solvent coatings, alternative clean-up techniques and solvents, higher transfer efficiency techniques for coating application, and add-on control devices. The estimated maximum emission reduction potential from this control measure is 221 tons/day of ROG.

Petroleum and Gas Production and Distribution -- including stringent use of add-on control devices for production, refining and product distribution. The estimated maximum emission reductions from this control measure are 15 tons/day of ROG; 25 tons/day of NOx; 16 tons/day of SOx; and 2 tons/day of PM.

Industrial and Commercial Processes -- including the use of add-on control devices or alternative clean fuels to control emissions from small sources which are now exempt or are not regulated by District rules. The estimated maximum emission reductions from this control measure are 25 tons/day of ROG; 98 tons/day of NOx; 1 ton/day of SOx; 47 tons/day of PM; and 43 tons/day of CO.

Residential and Public Sectors -- including measures for controlling energy consumption in the residential sector and measures to control emissions through improved local government administrative procedures. The estimated maximum emission reductions from this control measure are 24 tons/day of ROG; 22 tons/day of NOx; 6 tons/day of SOx; 512 tons/day of PM; and 193 tons/day of CO.

Agricultural Processes -- including measures for controlling pesticide applications, improved housekeeping procedures, and alternative waste disposal methods. The estimated maximum emission reductions from this control measure are 13 tons/day of ROG; 0.4 tons/day of PM; and 24 tons/day of NH3.

Others -- including measures affecting more than one source category, such as the use of Best Available Retrofit Control Technology (BARCT), specifying limits on liquids storage, and energy conservation requirements. The estimated maximum emission reductions from this control measure are 77 tons/day of ROG; 44 tons/day of NOx; 26 tons/day of SOx; 37 tons/day of PM; and 29 tons/day of CO.

Transportation Source Control Measures

Motor Vehicles -- including improved motor vehicle emission control systems and stricter standards. The estimated maximum emission reductions from this control measure are 136 tons/day of ROG; 239 tons/day of NOx; 2 tons/day of SOx; 10 tons/day of PM; and 1780 tons/day of CO.

Transportation Systems and Land Use -- including measures designed to decrease vehicle emissions by reducing vehicle use through means such as alternative work schedules, telecommunication, and improved traffic flow. The estimated maximum emission reductions from this control measure are 118 tons/day of ROG; 166 tons/day of NOx; 19 tons/day of SOx; 34 tons/day of PM; and 1342 tons/day of CO.

Off-Road Vehicles -- including measures designed to reduce emissions from railroads, boats and ships, and aircraft by restricting the use of, and imposing stricter emission standards on, these vehicles. The estimated maximum emission reductions from this control measure are 53 tons/day of ROG; 75 tons/day of NOx; 21 tons/day of SOx; 8 tons/day of PM; and 211 tons/day of CO.

Tier II - Significant Advancement of Technology and Regulatory Intervention

Tier II is directed at demonstrated technologies requiring further advancement or improvement which can reasonably be expected to occur within the planning time frame. In some cases these control measures are technology forcing. Regulatory intervention is employed when necessary to expedite commercialization of new products and to eliminate future emission growth. Tier II strategies are designed to meet the following goals:

Extending and expanding current technological applications beyond the levels traditionally pursued;

Developing strong public and private commitments when significant infrastructure changes are required;

Introducing active regulatory intervention through technology-forcing standards or emission fees.

Detailed descriptions of the proposed measures include provided in AQMP Appendix IV-A. They are divided into four basic types which are discussed briefly below.

Transportation Source Controls

The goals for the control of transportation emissions sources are; attaining 40 percent penetration of clean fuel passenger vehicles; attaining 70 percent penetration of clean fuel freight vehicles; and attaining 50 percent penetration of clean fuel off road vehicles. The estimated maximum emission reductions from this control measure are -10 tons/day of ROG; 61 tons/day of NOx; 10 tons/day of SOx; 3 tons/day of PM; and 193 tons/day of CO.

Surface Coating and Solvent Use Goals

This goal is to attain a 50 percent reduction of the remaining ROG emissions after implementing Tier I. This can be accomplished through reformulation of products, improved application techniques and operating modifications. The estimated maximum emission reductions from this control measure are 115 tons/day of ROG.

Goals for All Sources

Further control of emissions from all sources, including indirect sources, will be necessary to reach the goal of minimizing existing emissions, as well as offsetting potential emission growth. The estimated maximum emission reductions from this control measure are 28 tons/day of ROG; 14 tons/day of NOx; 7 tons/day of SOx; 223 tons/day of PM; and 13 tons/day of CO.

Tier III - Major Technological Breakthroughs

Tier III will require major technological breakthroughs and massive investments in infrastructure in order to be fully implemented by 2007. These strategies would result in:

Virtual elimination of emissions from surface coating and solvent use;

Virtual elimination of fuel combustion emissions from all automobiles, and light and medium duty trucks; and

Clean fuels for all remaining vehicles.

These emission reduction goals can be realized in the following ways:

Surface Coating and Solvent Use

Elimination of reactive solvent emissions can be achieved through applying several control methods in combination, including alternative process and products that do not require the use of either reactive or halogenated hydrocarbon-based solvents, reformulation of solvent-based products, and banning those products for which no reformulation options exist. The total emission reduction potential is about 100 tons per day of ROG.

Electric Vehicles

This strategy would require the replacement of fuel combustion for mobile sources with electric or solar powered automobiles, and light and medium duty trucks. Breakthroughs in battery, electrical generation and distribution technologies will be required. To avoid emission tradeoffs, an energy policy will be followed that will minimize in-Basin generated emissions.

The estimated maximum emission reduction potential of electrification is 78 tons/day of ROG, 86 tons/day of NO_x , 92 tons/day of CO, 10 tons/day of SO_x , 3 tons/day of PM and 1023 tons/day of CO.

Clean Fuel Vehicles

Tier III strategy requires that, for all mobile sources that cannot be electrified, such as heavy duty trucks and small recreational vehicles, clean fuels, such as methanol, be used. The estimated maximum emission reduction potential of electrification is 3 tons/day of ROG, 31 tons/day of NO_x , 6 tons/day of CO, 2 tons/day of SO_x , and 73 tons/day of PM.

Emissions Reduction Summary

The individual control measures are described in detail in Appendices IV-A and IV-E through IV-G of the AQMP. The projected emissions reductions for the two major classes of control measures for each of the three tiers are summarized in Tables 2-2 to 2-4. Table 2-5 presents the total AQMP projected emissions reductions.

Table 2-2

Summary of Tier I Emission Reductions
And Emission Inventory

Sources	Pollutant (Tons/Day)				
	ROG	NOx	CO	SOx	PM
Year 2010 Baseline					
Tier I Emission Reductions					
Stationary	350	210	290	58	733
Transportation	245	388	2578	16	40
Total	595	598	2868	74	773
Year 2010 Remaining Emissions After Tier I					

Table 2-3

Summary of Tier II Emission Reductions
And Emissions Inventory

Sources	Pollutant (Tons/Day)				
	ROG	NOx	CO	SOx	PM
Year 2010 Remaining Emissions After Tier I					
Tier II Emission Reductions					
Stationary	165	14	13	7	223
Transportation	20	109	453	11	288
Total	185	123	466	18	511
Year 2010 Remaining Emissions After Tier II					

Table 2-4

Summary of Tier III Emission Reductions

Sources	ROG	Pollutant (Tons/Day)		SOx	PM
		NOx	CO		
Year 2010 Baseline After Tier II					
Tier III Emission Reductions					
Stationary	121	—	—	—	—
Transportation	65	102	1027	15	9
Total	186	102	1027	15	9
Remaining Emissions After Tier III					

Table 2-5
AQMP Emissions Reduction Summary
(tons per day [t/d])

Control Category	NO _x	SO _x	CO	ROG	PM
Stationary Sources	224	65	303	636	956
Transportation Sources	599	42	4058	330	337
Total Sources	823	107	4361	966	1293

ALTERNATIVES TO THE PROPOSED PROJECT

Four alternatives to the proposed project are presented in this EIR. These alternatives are not discussed in terms of variations in control measures within each tier, but rather in terms of whether the basic AQMP goal of clean air attainment is reached, and the date of attainment. The alternatives are discussed in more detail in Chapter V.

No Project Alternative

The No Project alternative assumes that the Air Quality Management Plan is not adopted in any form. This would imply that the 1979 AQMP would remain as the only federally approved air quality plan for the region.

No environmental benefits have been identified for this alternative. Significant adverse consequences involve both legal and environmental impacts. The most significant adverse impact would be the expected continuation of poor air quality in the Basin, and its probable deterioration due to population growth.

Partial Implementation Alternative

This alternative involves the partial implementation of the proposed AQMP through the imposition of Tier I and Tier II emission controls only. The air quality impacts of this alternative have not been modeled, but the emission reduction shortfall would probably not allow for attainment of the ambient air quality standards. The potential adverse environmental impacts of Tier III implementation would be avoided, but the legal ramifications of non-attainment planning would remain. Air quality in the Basin may be marginally improved.

Additional Emissions Reduction Effort Alternative

This alternative would call for the implementation of additional emission control efforts beyond those called for in the proposed AQMP. This would be done in order to attain the clean air standards with a margin to allow for emission forecasting errors or unanticipated population or economic growth. Emission reductions for this alternative have not been estimated, so the "margin of safety" to be achieved is unknown. It is probable that the adverse impacts associated with Tier III implementation would be intensified under this alternative.

ROG Controls Only

An ROG only alternative would require only implementation of those measures which would reduce reactive organic gases and not nitrogen oxides. Emission reductions that may be achieved under this strategy have not been fully modeled, yet it is unlikely that implementation of this strategy would permit attainment of the air quality standards.

Delayed Compliance Alternative

This alternative would allow for the implementation of the proposed AQMP over a longer time frame -- perhaps 30 to 40 years for attainment instead of the planned 20 year attainment. This would allow for an easier socioeconomic transition to occur during the implementation of the proposed control measures, especially those for Tier II and Tier III. The most significant adverse environmental impact is expected to be the continued non-attainment of clean air standards for a considerably longer period of time. Other environmental impacts are expected to be similar to those anticipated for the AQMP.

Alternative Growth Scenario

This alternative would use an alternative growth scenario to gauge the degree of implementation required for the AQMP control measures. Although it is unlikely that the set of measures included in the 1988 AQMP Revision would change substantially, the level of implementation may differ. The potential adverse impacts may be mitigated slightly through this alternative. However, it is unlikely that Tier III strategies would be abandoned entirely.

CHAPTER 3

EXISTING AND FORECAST SETTING IN THE BASIN

**Climate and Meteorology
Existing and Forecast Setting**

CLIMATE AND METEOROLOGY

The climate of the South Coast Air Basin is controlled primarily by the strength and location of a semipermanent, subtropical high pressure cell over the Pacific Ocean. Climate is also affected by the moderating effects of the nearby oceanic heat reservoir. Local climatic conditions are characterized by warm summers, mild winters, infrequent rainfall, moderate daytime onshore breezes, and moderate humidity.

Temperature ranges from an average minimum of 57.5° F in January, to an average maximum of 79.2° F in July. The mean annual temperature is 67° F, with relatively small daily and seasonal variations above or below the mean. Most precipitation occurs between November and March, with a mean annual precipitation of 8.92 inches (SCAQMD, 1981).

The prevailing summer daytime winds in the area come from the southwest at 8 to 12 miles per hour (mph). On summer nights, the pattern reverses, with winds coming from the north at 4 to 6 mph. In the winter months, daytime ocean winds come in at 7 to 9 mph, and nighttime winds are 3 to 8 mph. There are occasional hot, dry easterly winds (Santa Ana winds) in the region. These winds usually occur during the autumn months and last 2 to 3 days on average.

The Basin is an area of high air pollution potential because the dispersion of air pollutants is hampered by frequent temperature inversions that tend to trap stagnant air pollutants in a limited atmospheric volume near the ground. The combination of low altitude temperature inversions, meteorological conditions - such as light winds and shallow vertical mixing, and topographical features - such as the surrounding mountain ranges, hinder the dispersal of air pollutants.

In the winter, temperature inversions occur close to ground level during the night and early morning hours. At this time, the greatest pollution problems are from carbon monoxide and NO_x. In the summer, the longer daylight hours and plentiful sunshine provide the energy needed for the photochemical reactions between NO_x, volatile organic compounds, and other substances, resulting in higher ozone concentrations.

A substantial fraction of PM₁₀ is, like ozone, formed in the atmosphere by chemical reactions of gaseous sulfates, nitrates, and hydrocarbon compounds

(SCAQMD, 1986a). Therefore, like ozone, peak concentrations occur downwind of the areas with heaviest precursor emissions. Unlike ozone, there is little seasonal variation in PM_{10} concentrations.

EXISTING AND FUTURE SETTINGS

Existing Air Quality

The Basin has one of the worst air quality problems in the nation. Of the six criteria pollutants, the Basin complies with only two national ambient air quality standards. The six standards are based upon the known health effects of the criteria pollutants, and were established to protect public health with a margin of safety. In addition to these ambient air quality standards, California has adopted a set of episode criteria for carbon monoxide, NO_2 , SO_2 , and particulate matter. Episode levels represent periods of short-term exposure to criteria pollutants during which public health is actually threatened. Health effects are progressively more severe and widespread as pollutant levels increase from Stage One through Stage Three Episode levels.

It is the responsibility of the District to ensure that state and federal ambient air quality standards are achieved and maintained. Ambient air quality for criteria air contaminants is measured by the District at a network of monitoring stations located throughout the Basin (See Fig. 3-1). These data, given in Table 3-1, detail the current air quality status and progress toward attainment of federal and state air quality standards (SCAQMD, 1987). A brief description follows below of the pollutants that contribute most to the poor air quality in the Basin. Sulfur oxides and lead are not discussed because the Basin currently complies with the state and federal standards for these two pollutants, and these standards are expected to be maintained throughout the period covered by the AQMP.

Figure 3-1
Boundaries of the South Coast Air Basin

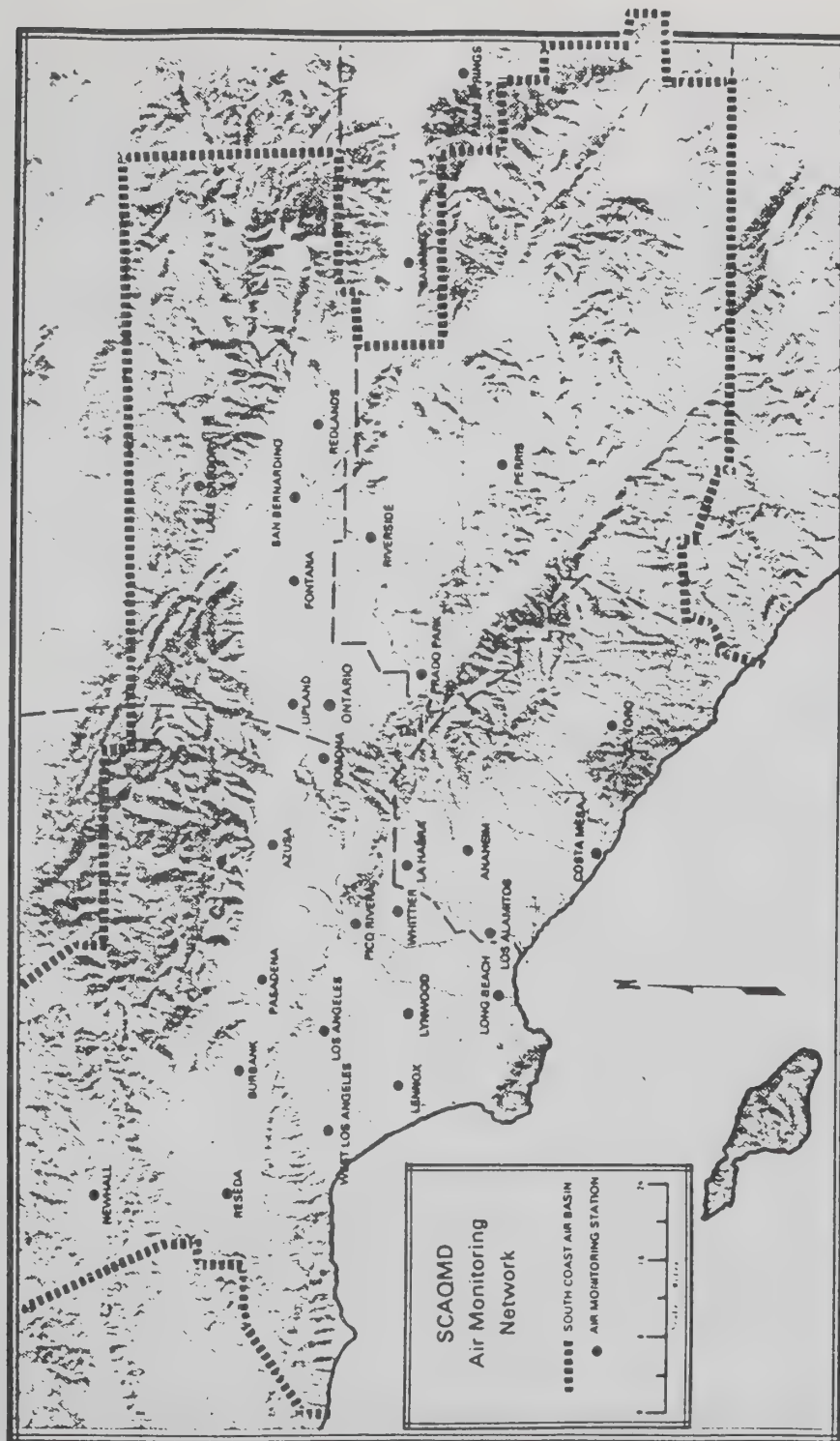


Table 3-1
Air Quality Data 1987
South Coast Air Quality Management District

Source/ Receptor Area	Location of Air Monitoring Station	Carbon Monoxide						Ozone			Nitrogen Dioxide				Sulfur Dioxide				Visibility	
		No. Days Standard Exceeded						No. Days Standard Exceeded			Standard				Standard				Location	Days not Meeting State Std. ^{d)}
		Max. Conc.	Max. Conc.	Federal		State		Max. Conc.	Federal	State	Max. Conc.	Criterion ^{a)}		No. Days Std. Exc'd.	Max. Conc.	Criterion	Federal			
		in PPM	in PPM	≥ 9.5	> 35	≥ 9.1	> 20	in PPM	> .12	≥ .10	in PPM	AA	X	> .25	in PPM	AA	> .14	≥ .05		
		1-Hour	8-Hour	8-Hr.	1-Hr.	8-Hr.	1-Hr.	1-Hour	1-Hour	1-Hour	1-Hour	PPM	Exc'd.	1-Hour	1-Hour	PPM	24-Hr.	24-Hr. ^{c)}		
1	Los Angeles	15	10.9	1	0	1	0	.22	36	91	.42	.0537	0.56	4	.03	.0042	0	0	Burbank Airport	242
2	W. Los Angeles	13	7.5	0	0	0	0	.28	16	58	.27	.0378	0	1	.03	.0022	0	0		
3	Hawthorne	22	14.1	18	0	22	2	.20	3	10	.23	.0353	0	0	.03	.0038	0	0	Los Angeles International	129
4	Long Beach	13	9.4	0	0	1	0	.17	4	11	.26	.0432	0	1	.06	.0058	0	0		
5	Whittier	13	9.7	1	0	1	0	.23	40	71	.25	.0466	0	0	.07	.0038	0	0		
6	Besede	15	12.1	1	0	2	0	.22	60	121	.15	.0319	0	0	.02	.0022	0	0	Long Beach Airport	177
7	Burbank	15	12.5	9	0	11	0	.23	76	130	.26	.0516	0	1	.02	.0023	0	0		
8	Pasadena	15	11.3	2	0	2	0	.28	95	150	.21	.0420	0	0	.02	.0020	0	0		
9	Azusa	9	6.0	0	0	0	0	.30	111	163	.23	.0498	0	0	.03	.0024	0	0		
9	Glendora	NM	NM	NM	NM	NM	NM	.33	135	180	.17	.0380	0	0	NM	NM	NM	NM	William J. Fox Airport (Lancaster)	1
10	Pomona	14	10.0	1	0	1	0	.29	72	122	.22	.0547	2.40	0	NM	NM	NM	NM		
11	Pico Rivera	12	10.0	1	0	2	0	.28	63	120	.24	.0486	0	0	.09	.0036	0	0		
12	Lynwood	26	19.6	40	0	47	10	.24	11	24	.26	.0429	0	1	.06	.0054	0	0		
13	Banham	NM	NM	NM	NM	NM	NM	.21	67	129	NM	NM	NM	NM	NM	NM	NM	NM		
14	Lancaster	12	3.9	0	0	0	0	.17	32	105	.09	.0161	0	0	NM	NM	NM	NM		
16	La Habra	21	10.6	2	0	3	1	.24	41	77	.22	.0382	0	0	.04	.0042	0	0		
17	Anaheim	16	8.7	0	0	0	0	.22	25	48	.22	.0421	0	0	.03	.0028	0	0		
17	Los Alamitos	NM	NM	NM	NM	NM	NM	.17	4	15	NM	NM	NM	NM	.03	.0024	0	0		
18	Costa Mesa	12	8.4	0	0	0	0	.16	2	23	.19	.0281	0	0	.03	.0020	0	0		
19	El Toro	8	6.3	0	0	0	0	.20	16	36	NM	NM	NM	NM	NM	NM	NM	NM		
22	Norco	NM	NM	NM	NM	NM	NM	.24	73	139	NM	NM	NM	NM	NM	NM	NM	NM	March Field (Riverside)	215
23	Rubidoux	9	6.1	0	0	0	0	.29	113	168	.21	.0269	0	0	.02	.0015	0	0		
23	Riverside (Magnolia)	13	7.6	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM		
24	Perris	NM	NM	NM	NM	NM	NM	.20	82	136	NM	NM	NM	NM	NM	NM	NM	NM		
28	Redding	NM	NM	NM	NM	NM	NM	.18	27	83	NM	NM	NM	NM	NM	NM	NM	NM		
29	Banning	NM	NM	NM	NM	NM	NM	.21	53	96	NM	NM	NM	NM	NM	NM	NM	NM		
30	Palm Springs	5	2.9	0	0	0	0	.17	33	74	.08	.0190	0	0	NM	NM	NM	NM		
30	Indio ^{e)}	NM	NM	NM	NM	NM	NM	.16	14	41	NM	NM	NM	NM	NM	NM	NM	NM		
32	Upland	7	5.1	0	0	0	0	.28	101	150	.20	.0472	0	0	.02	.0011	0	0	Norton Air Force Base (San Bernardino)	237
33	Ontario	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM		
33	Chino ^{f)}	NM	NM	NM	NM	NM	NM	.04	0	0	NM	NM	NM	NM	NM	NM	NM	NM		
34	Fontana	6	4.0	0	0	0	0	.29	116	165	.18	.0383	0	0	.02	.0014	0	0	Ontario Airport	235
34	San Bernardino	11	6.7	0	0	0	0	.25	117	166	.19	.0430	0	0	.03	.0019	0	0		
35	Redlands	NM	NM	NM	NM	NM	NM	.24	120	161	NM	NM	NM	NM	NM	NM	NM	NM		
37	Crestline	NM	NM	NM	NM	NM	NM	.29	119	156	NM	NM	NM	NM	NM	NM	NM	NM		

PPM - Parts by volume per million parts of air.

AA - Annual Arithmetic Mean.

NM - Pollutant not monitored.

^{a)} - Data received from FAA.

^{b)} - The federal Standard is annual arithmetic mean NO₂ greater than 0.0534 ppm.

^{c)} - The other federal (3-hour average > 0.50 PPM; 0.03 PPM, AA) and state (1-hour > 0.25 PPM) standards were also not exceeded.

^{d)} - Twenty-four hour average SO₂ ≥ 0.05 PPM with 1-hour Ozone ≥ 0.10 PPM, or with 24-hour TSP ≥ 100 ug/m³.

^{e)} - Visibility standard is less than 10 miles for hours with relative humidity less than 70%.

^{f)} - Ozone monitored July 1 - September 18, 1987.

^{g)} - Ozone monitoring terminated January 30, 1987.



**SOUTH COAST
AIR QUALITY MANAGEMENT DISTRICT**
9150 Flair Drive
El Monte, CA 91731

Table 3-1 Continued
Air Quality Data 1987
South Coast Air Quality Management District

Source/ Location Receptor of Area Air Monitoring No. Station	Suspended Particulates PM ₁₀ ^{g)}								Particulates TSP ^{h)}			Lead ^{h)}			Sulfate ^{h)}	
	No. (%) Samples Exceeding Standard				Percent Standard Exceeded ⁱ⁾							Occasions Exceeding Std.			Number of No. Samples Exceeding Std.	
	Federal		State		Federal		State					Federal			State	
	Number of Samples	Max. 24-Hr. Conc. ug/m ³	>150 ug/m ³ 24-Hour	>50 ug/m ³ 24-Hour	AAH Conc. ug/m ³	AGM Conc. ug/m ³	>50 ug/m ³	>30 ug/m ³	Number of Samples	Max. 24-Hr. Conc. ug/m ³	AGM Conc. ug/m ³	Max. 24-Hr. Conc. ug/m ³	>1.5 ug/m ³ Ortl. Avg.	≥1.5 ug/m ³ Mo. Avg.	Max. 24-Hr. Conc. ug/m ³	State ≥25 ug/m ³ 24-Hr.
1 Los Angeles	58	158	1 (1.7)	36 (62.1)	56.6	50.6	13.2	68.7	61	216	91.4	0.43	0	0	14.5	0
2 W. Los Angeles	NM	NM	NM	NM	NM	NM	NM	NM	59	125	57.2	NM	NM	NM	15.2	0
3 Hawthorne	NM	NM	NM	NM	NM	NM	NM	NM	59	150	76.5	0.44	0	0	20.6	0
4 Long Beach	55	113	0 (0)	18 (32.7)	50.5	45.8	1.0	52.7	60	174	86.3	0.53	0	0	17.6	0
5 Whittier	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
6 Reseda	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
7 Burbank	59	147	0 (0)	36 (61.0)	60.2	53.7	20.4	78.9	61	180	91.9	0.44	0	0	17.5	0
8 Pasadena	NM	NM	NM	NM	NM	NM	NM	NM	59	139	70.0	NM	NM	NM	14.0	0
9 Azusa	59	188	2 (3.4)	38 (64.4)	68.2	58.7	36.4	95.7	61	254	111.8	NM	NM	NM	15.4	0
9 Glendora	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
10 Pomona	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11 Pico Rivera	NM	NM	NM	NM	NM	NM	NM	NM	60	263	95.0	0.72	0	0	17.8	0
12 Lynwood	NM	NM	NM	NM	NM	NM	NM	NM	53	221	115.2	0.54	0	0	18.2	0
13 Newhall	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
14 Lancaster	NM	NM	NM	NM	NM	NM	NM	NM	60	187	64.2	NM	NM	NM	7.3	0
16 La Habra	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
17 Anaheim	NM	NM	NM	NM	NM	NM	NM	NM	61	202	84.6	0.28	0	0	14.6	0
17 Los Alamitos	59	163	1 (1.7)	21 (35.6)	48.6	42.4	0	41.3	57	648 ^{l)}	91.9	NM	NM	NM	18.2	0
18 Costa Mesa	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
19 El Toro	61	107	0 (0)	15 (24.6)	40.0	36.1	0	20.3	60	150	68.8	NM	NM	NM	14.3	0
22 Norco	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
23 Rubidoux	60	219	7 (11.7)	46 (76.7)	89.6	73.5	47.0	145.0	60	305	116.9	0.20	0	0	16.1	0
23 Riverside (Magnolia)	NM	NM	NM	NM	NM	NM	NM	NM	61	234	106.5	0.27	0	0	19.7	0
24 Perris	15 ^{j)}	187	0 (0)	5 (33.3)	49.2	31.8	0	6.0	59	255	88.2	NM	NM	NM	15.6	0
28 Hemet	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
29 Banning	61	163	1 (1.6)	22 (36.1)	44.1	34.0	0	13.3	61	213	68.7	NM	NM	NM	15.2	0
30 Palm Springs	20 ^{k)}	121	0 (0)	5 (25.0)	33.4	24.1	0	0	61	180	58.8	NM	NM	NM	10.4	0
30 Indio	61	115	0 (0)	25 (41.0)	51.4	44.2	2.8	47.3	60	331	100.6	NM	NM	NM	10.3	0
32 Upland	NM	NM	NM	NM	NM	NM	NM	NM	61	212	92.2	0.23	0	0	18.0	0
33 Ontario	60	182	1 (1.7)	41 (68.3)	69.8	60.3	39.6	101.0	55	242	106.0	NM	NM	NM	17.8	0
33 Chino	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
34 Fontana	60	203	3 (5.0)	38 (63.3)	73.9	57.6	47.8	92.0	59	298	108.3	NM	NM	NM	18.7	0
34 San Bernardino	61	211	2 (3.3)	36 (59.0)	70.0	55.2	40.0	84.0	60	271	107.6	0.23	0	0	17.6	0
35 Redlands	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
37 Crestline	NM	NM	NM	NM	NM	NM	NM	NM	60	218	48.2	NM	NM	NM	13.1	0

ug/m³ - Micrograms per cubic meter of air.

AGM - Annual Geometric Mean.

g) - suspended particulates PM₁₀ samples were collected every 6 days using the size-selective inlet high volume sampler with quartz filter media (PM₁₀ refers to fine particles with aerodynamic diameter of 10 micrometers or less).

h) - Total suspended particulates, lead, and sulfate were determined from samples collected every 6 days by the high volume sampler method, on glass fiber filter media. Federal TSP standard superseded by PM₁₀ standard, July 1, 1987.

i) - Federal PM₁₀ standard is AAH >50 ug/m³; state standard is AGM >30 ug/m³.

j) - Sampling period: October - December.

k) - Sampling period: September - December.

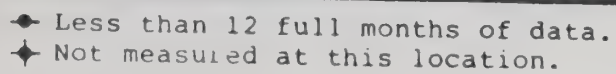
l) - Adjacent parking lot was being swept during sampling period. Second high concentration 310 ug/m³.

Oxides of Nitrogen

Nitrogen dioxide (NO_2) is a brownish gas formed in the atmosphere primarily by the rapid reaction of the colorless gas nitric oxide (NO) with atmospheric oxygen. It is these two compounds, NO and NO_2 , that are referred to collectively as NO_x . The federal ambient air quality standard for NO_2 is 100 ug/m^3 or 0.0532 ppm (annual average of all hours), and the California ambient air quality standard is 0.25 ppm (one-hour average).

The Basin is the only area in the nation that still exceeds the NO_2 federal ambient air quality standard. NO_2 levels are currently about 15 percent above the federal standard. District staff estimate that it will require nearly 10 years to attain this standard (SCAQMD, 1987a). NO_x emissions not only contribute to high ozone and NO_2 levels, but they also play an important role in visibility degradation, formation of PM_{10} , and acid deposition (SCAQMD, 1987a).

Approximately 985 tons per day of NO_x emissions are released in the Basin from all sources. These sources include: mobile sources such as passenger vehicle, freight vehicles, and other mobile sources; residential and recreational sources; manufacturing sources; petroleum production/marketing sources; electric power production and; services, commercial and other sources (SCAQMD, 1987a). NO molecules rapidly oxidize to form NO_2 , which results in the highest concentrations of NO_2 relatively close to the areas where NO_x emissions are greatest. Therefore, the highest NO_x emission levels occur in an area stretching from Lynwood northward through downtown Los Angeles and into the eastern San Fernando Valley (Figure 3-2). The area around Pomona also register high readings. All stations in Orange, Riverside, and San Bernardino Counties were in compliance with the federal NO_2 standard in 198.



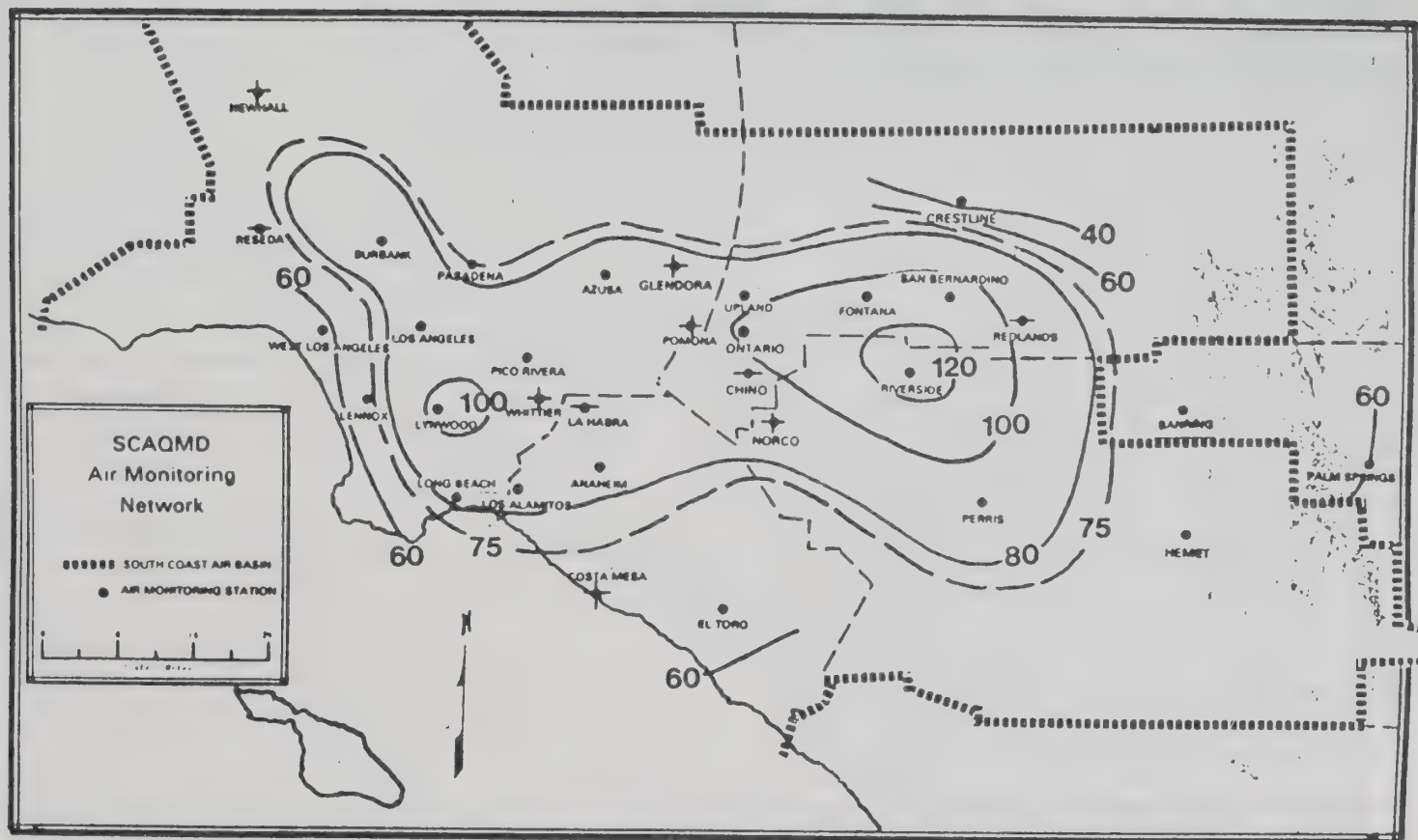
Source: SCAQMD, 1985, Figure 9, P. 10.

PM₁₀

Suspended particulate matter 10 micrometers or less in diameter, or PM₁₀, is a complex mixture of man-made and natural substances including sulfates, nitrates, metals, elemental carbon, sea salt, soil, organics, and biological materials. Approximately 90 percent by weight of all emitted particles are larger than 10 micrometers in diameter, but about 90 percent of the total number of particulates are less than 5 micrometers in diameter (SCAQMD, 1987b). In areas close to major sources, particulate concentrations are generally higher in the winter when more fuel is burned and meteorological conditions favor the build-up of directly-emitted contaminants. In areas remote from major sources and subject to photochemical smog, particulate concentrations are higher during summer months. These data are presented in Figure 3-3.

PM₁₀ may have negative health impacts because it is able to penetrate deeply into the respiratory system. In some cases, the particulates themselves may cause actual damage to the alveoli of the lungs or they may contain adsorbed substances that are injurious. Nitrates and sulfates, which are major components of PM₁₀, are also associated with acid fog and acid deposition (Broadbent, et al., 1985; SCAQMD, 1987a). In some areas of the Basin, PM₁₀ levels are nearly twice the federal standard.

FIGURE 3-3
Total Suspended Particulates* - 1986
Annual Geometric Mean, $\mu\text{g}/\text{m}^3$



✦ Not measured at this location.
 • Less than 12 full months of data.
 --- Federal primary standard = $75 \mu\text{g}/\text{m}^3$ TSP, annual geometric mean.

* Includes PM_{10}

Source, SCAQMD and SCAG, 1987, Figure V-1, p. V-6.

Ozone

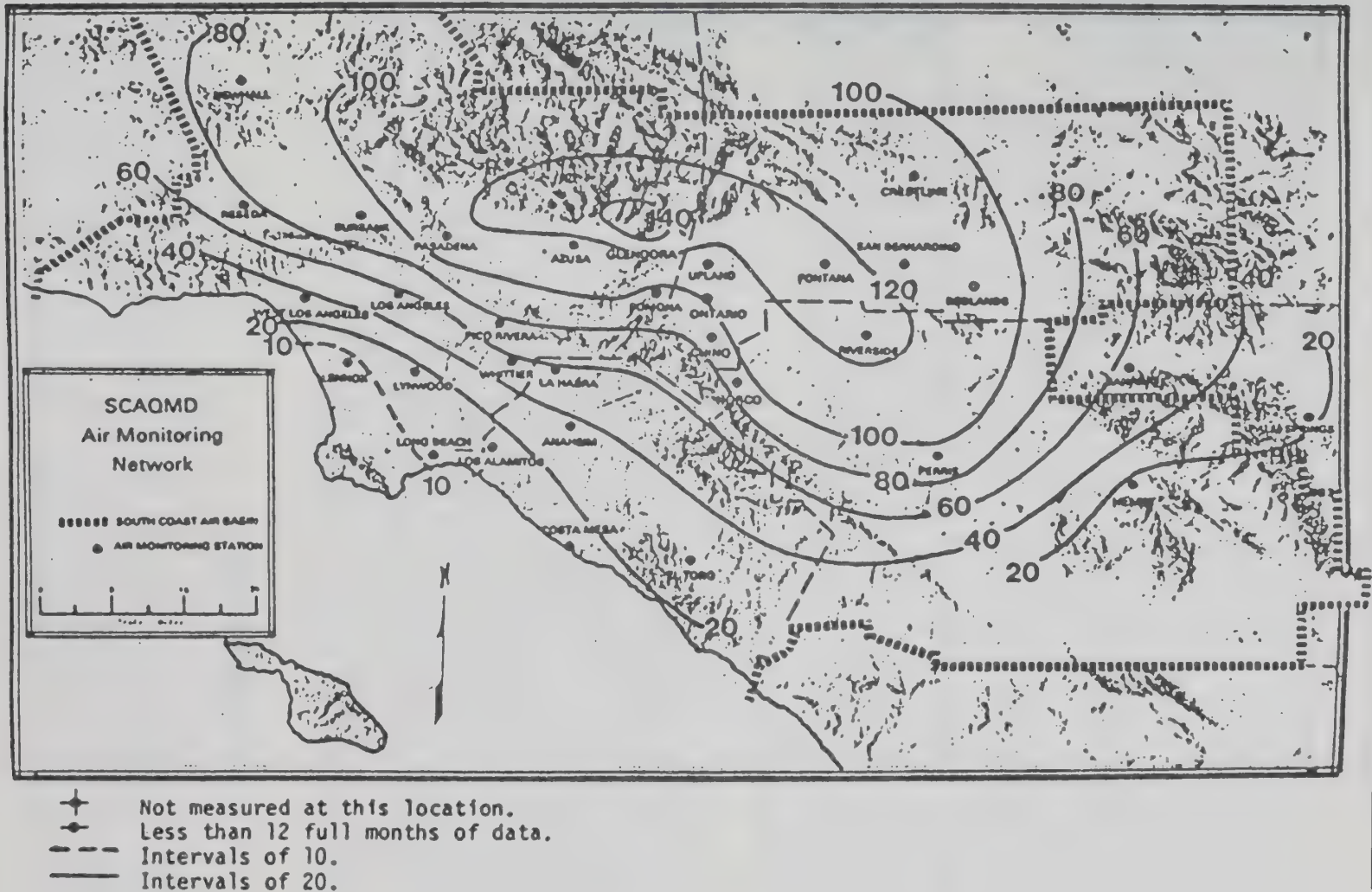
Unlike the other criteria air pollutants, ozone is not a primary pollutant; that is, it is not emitted directly into the atmosphere from a specific source. Instead, ozone is a secondary pollutant formed from reactive organic gases (ROGs), nitrogen oxides (NO_x), oxygen, and other hydrocarbon materials as a result of photochemical reactions that occur in the atmosphere. The relationship between ozone and NO_x is further complicated by the fact that NO_x both forms and destroys ozone at different stages of the photochemical cycle.

Ozone levels in the Basin are nearly three times the national standard established to protect public health. Between 1984 and 1986, the ozone standard was exceeded an average of 140 days per year in the Basin (SCAQMD, 1987a). The greatest average number of exceedances outside of California was 20 days a year in Houston, Texas and the New York City metropolitan area. Typically, ozone levels are lowest along the coast and increase with distance inland. The highest ozone readings occur in an area stretching from Pasadena to San Bernardino and the adjacent mountains. The federal ozone standard of .12 ppm was exceeded most frequently in Glendora, Azusa, Fontana, and Crestline, as shown in Figure 3-4.

FIGURE 3-4

OZONE - 1986

NUMBER OF DAYS ON WHICH THE FEDERAL STANDARD WAS EXCEEDED
(1-HOUR $O_3 > 0.12$ PPM)



Source, SCAQMD and SCAG, 1987, Figure V-1, p. V-6.

Reactive Organic Gases

There are no state or federal ambient air quality standards for ROG emissions because ROG emissions are not criteria pollutants. However, ROG emissions react with other pollutants in the presence of sunlight to form photochemical oxidants, most notably ozone. ROG emissions consist primarily of hydrocarbons, the exact nature of which depend upon the total hydrocarbon content present in the ambient air. Atmospheric hydrocarbon concentrations are generally higher in winter because these reactive hydrocarbons react more slowly and meteorological conditions are more favorable for their accumulation to higher concentrations before producing photochemical oxidants. ROG emissions also contribute to PM₁₀ and poor visibility.

Reduction of ROG emissions is part of the District's long range strategy to attain the ozone standard. The District has identified a combination of ROG emissions reduction strategies that, if implemented by the year 2000, may allow the District to attain the ozone standard. However, to be effective, these ROG emissions reductions strategies must be implemented in the "near future" (SCAQMD and SCAG, 1987).

Although the specific health effects of some of the gaseous hydrocarbon components of ROG emissions in ambient air have not been demonstrated, health impacts are known to occur at high concentrations (1000 ppm or greater), because of interference with oxygen uptake. In general, these hydrocarbons in the atmosphere are suspected to cause coughing, sneezing, headaches, nervous weakness, laryngitis, and bronchitis, even at low concentrations (Davis, et al., 1977). The effect of these hydrocarbons is intensified when they react with NO_x. Other hydrocarbon components of ROG emissions are thought or are known to be hazardous. For example, benzene, one hydrocarbon component of ROG emissions, is a known human carcinogen. Hematologic effects have been reported from repeated exposure to concentrations as low as 60 ppm (Cornish, 1980).

Carbon Monoxide

Carbon monoxide (CO) levels are approximately twice the federal ambient air quality standard. During the years 1983 and 1984, exceedances occurred on the average of approximately 60 days per year. Denver and New York City had comparable CO levels, while some cities in Arizona have an average of 120 days of CO exceedances (SCAQMD, 1987a). In 1986, most exceedances of the CO

standard in the Basin occurred in Los Angeles county, with the highest number recorded at the Lynwood and Lennox monitoring stations. There were four exceedances recorded in Orange County and none in Riverside or San Bernardino Counties.

Visibility

Reduced visibility is an apparent manifestation of poor air quality. Factors that limit visibility include atmospheric aerosols and particulates that reflect, scatter, and/or absorb light. Reduced visibility is attributed to natural sources such as water droplets (principally fog), salt particles, smoke and other particles from wild fires, and wind-blown dust. Human sources of atmospheric particles include combustion by-products, such as sulfur oxide and NO_x emissions, and aerosols produced in manufacturing processes, for example, ROG_s. Since 1950, visibility trends have shown that the area with the greatest number of low visibility days per year has shifted from central Los Angeles to the sub-basin east of the Chino Hills (SCAQMD, 1981).

Future Air Emissions

Using emission modeling techniques, the District has estimated future baseline pollutant emissions in the Basin. These emissions estimates assume no new control efforts other than those currently in place. These emission estimates also assume that current population growth patterns will continue, as projected in SCAG's baseline population growth. The projected emissions for 2000 and 2010 are given in Table 3-2 and Table 3-2.

Table 3-2
Summary of Emissions
By Major Source Categories: 2000 Baseline
(tons/day)

SOURCE CATEGORY	ROG	NOx	SOx	CO	PM	PM10
<u>Stationary Sources</u>						
Fuel Combustion	23	226	30	108	17	15
Waste Burning	1	1	1	4	1	1
Solvent Use	431	0	0	0	1	1
Petroleum Process Storage & Transfer	77	7	27	4	4	3
Industrial Processes	27	6	8	3	18	12
Miscellaneous Processes	92	14	3	78	2,075 *	894
Total Stationary Sources	651	254	69	197	2,116	926
<u>Mobile Sources</u>						
On-Road Vehicles	257	477	28	3,006	96	49
Other Mobile	111	173	36	682	15	14
Total Mobile Sources	368	650	64	3,688	111	63
Total	1,019	904	133	3,885	2,227	989

*Includes Paved Road Dust

Table 3-3
Summary of Emissions
By Major Source Categories: 2010 Baseline
(tons/day)

SOURCE CATEGORY	ROG	NOx	SOx	CO	PM	PM10
<u>Stationary Sources</u>						
Fuel Combustion	24	241	31	114	18	15
Waste Burning	1	1	1	5	1	1
Solvent Use	469	-	-	-	1	1
Petroleum Process Storage & Transfer	79	7	27	4	5	3
Industrial Processes	29	7	9	3	19	13
Miscellaneous Processes	97	15	3	79	2,254*	973
Total Stationary Sources	699	271	71	205	2,298	1,006
<u>Mobile Sources</u>						
On-Road Vehicles	326	570	30	3,938	111	56
Other Mobile	129	192	38	781	17	15
Total Mobile Sources	455	762	69	4,719	128	71
Total	1,154	1,033	141	4,924	2,426	1,077

*Includes Paved Road Dust

Population

The South Coast Air Basin has experienced substantial population growth throughout every period in its history. This growth trend yielded a 1984 population of 11.3 million. Table 3-4 below summarizes the population distribution among the four counties that comprise the Air Basin.

Table 3-4
Total Population:
South Coast Air Basin, 1980 and 1984

County	1980	Percent of Total	1984	Percent of Total	1988*	Percent of Total
Los Angeles	7,366,381	70	7,862,663	70	8,555,900	66
Orange	1,931,570	18	2,066,400	18	2,238,800	17
Riverside	478,981	5	535,878	5	946,100	7
San Bernardino	731,240	7	822,403	7	1,240,000	10
Basin Total	10,508,172		11,287,344		12,980,800	

Source: Southern California Association of Governments, Preliminary Draft Growth Management Plan, April 8, 1988.

* Total County figures include eastern portions outside Basin.

Growth Rate

The South Coast Air Basin has been characterized by sustained growth, in one or more areas simultaneously, over the past fifty years:

Los Angeles County's 1988 population of 8.6 million makes it California's most populous county, home to 70% of the Basin's population and a third of the total state population. The County experienced population growth rates of 5% per year during the 1940's

and 1950's, but that pace has slowed to an average of 1% per year since 1970.

With 17% of the Basin's population in 1988, Orange County's population tripled in the preceding twenty-four years.

As Los Angeles County's growth slowed during the 1970's, western Riverside County's increased at the rate of 4.6% per year from 1970 to 1984, and grew to 7% of the Basin's population.

The western portion of San Bernardino County has experienced growth rates similar to those characteristic of Riverside County, and also increased its relative share of the regional total.

Migration vs. Natural Increase

Migration has been a major component of population increase in the past. Within the six-county Southern California region (which includes the eastern portions of San Bernardino and Riverside Counties, Ventura County, and Imperial County in addition to the Basin), migration comprised 50% of the region's population growth from 1975 to 1980. Most of this has been foreign immigration, as net domestic in-migration has hovered near zero in recent years. The Southern California Association of Governments estimates that 9 million residents will leave the region from 1980 to 2010, but that approximately 11.4 million will arrive from other parts of the United States (8.1 million) and from foreign countries (3.3 million).

Natural increase, defined as births minus deaths, accounts for 56% of growth since 1980. This share of growth is expected to increase as the Hispanic community grows in the Basin. Hispanic birth rates are about 5.5 times greater than the Black birth rate, and 8 times greater than the Anglo birth rate.

Of the four components of population dynamics - births, deaths, immigration, and emigration - natural population increase, i.e., births minus deaths, is a slightly more important component of net population increase (56 percent) than net migration, i.e., immigration minus emigration (46 percent). Until the early 1970s, net domestic migration from "frostbelt to sunbelt" areas contributed a large portion of the total population growth. Since that time, net domestic migration has reached equilibrium, and net foreign migration has become more important.

Factors that have attracted immigrants to the Basin include:

The abundance of job opportunities in the Basin compared to other parts of the nation;

The proximity of Southern California to Mexico and Central America;

The location of this region on the Pacific Rim;

The similarity (warmth) of this region's climate to Latin American and Asian-Pacific countries; and

The large ethnic communities and cultural centers already established in the region (e.g., Koreatown, East Los Angeles, Orange County's Vietnamese Community, Little Tokyo ,etc.) (SCAG, 1987).

Population Growth Forecast

Projected Future Population Growth

The Southern California Association of Governments (SCAG) adopts regional growth forecasts which are used by the District in preparing the AQMP. At present, SCAG is developing revised projections for population, housing, and employment to replace its adopted SCAG-82 projections and an interim set of revisions called SCAG-82M. These new estimates include a Baseline Projection based on demographic trends, plus three alternative population distributions predicated on public policy interventions. The selected projections for population, employment and housing will be a unifying factor among the regional transportation, housing, air quality and growth management plans.

The SCAG Baseline Projection for the South Coast Air Basin is summarized in Table 3-5.

Table 3-5
Projected Future Population, 1984 - 2010

County	1984	Percent of Basin	2010	Percent of Basin	Percent of Increase
Los Angeles	7,862,663	70	9,948,695	62	27
Orange	2,066,400	18	3,050,208	19	48
Riverside	535,878	5	1,400,700	9	161
San Bernardino	731,240	7	1,748,700	11	139
Basin Total	11,196,181		16,148,303		43%

Source: Southern California Association of Governments, Preliminary Draft
 Baseline Projection, April 8, 1988.

According to these projections, Los Angeles County will experience the largest absolute increase in population, but it will lose some of its share of the basin total to Riverside and San Bernardino Counties. This projection represents an average annual regional growth rate of 2.1%.

Allocation of Future Growth

Recent trends indicate that the Basin's population growth will be allocated to three types of areas: existing urbanized, urbanizing and mountain/desert areas. Existing urban areas, such as Los Angeles County, will continue to grow, albeit at a rate lower than the basin average. Urbanizing areas, including Riverside County and western San Bernardino County, are located on the fringe of urbanized areas and will attract the greatest share of future population growth, at a rate of 4 to 5% per year. Mountain and desert areas will double their existing population, although this will remain a small fraction of the Basin total.

Growth Control Initiatives

A significant number of cities and counties within the Basin have or are now investigating measures to control or limit the population increase within their jurisdiction. Existing and proposed control techniques focus on limiting housing availability, or setting employment and retail space limits, rather than intervening directly to change immigration and birth rates. The severity, extent, and enforceability of growth limitations are not known at this time.

Employment and Economics

Between 1972 and 1984, the Southern California economy experienced rapid growth, particularly in the late 1970s. Total employment in the Basin increased from an annual average of 5,354,700 at the time of the 1980 census to 5,673,000 in 1984, a net increase of 318,300 jobs. In the early 1980s, the Basin began a transition from a goods producing manufacturing economy to an information based service economy. Other sectors with employment gains include finance, insurance, and real estate.

According to one analysis (SCAG, 1987), employment in the Basin is becoming bi-polar. That is, there has been growth in the low-skill, low-wage sector and in the high-skill, high-wage sector, but the middle-skill, middle-wage sector has experienced moderate growth or declines in some areas. Job growth in low-skill, low-wage sectors of the economy, such as apparel and furniture manufacture, showed an average annual increase of 3.2 and 4.0 percent respectively. Similarly, high-tech, high-skill, and high-wage manufacturing industries, such as computers, electrical machinery, and medical instruments experienced an average annual growth rate ranging between 4.3 and 11.0 percent. Another sector of the economy that experienced overall employment increases during this period was the services sector. The fastest growing services sectors were legal services and business services, increasing at average annual rates of 15.2 and 13.0 percent, respectively. During this same period there were absolute declines in middle-skill, middle-wage industries such as lumber and wood products, stone, clay, glass, and primary metal.

Due to prevailing wages and the diversity of the local economy, the per capita income of the region ranks high compared to the national average. The Basin has the highest concentration of mathematicians, scientists, engineers, and skilled technicians in the nation, and the greatest aggregation of advanced technology industries. Table 3-6 shows per capita income by county for 1982

and 1985. The Los Angeles County per capita income in 1985 was 114 percent of the national average, while the Orange County 1985 per capita income was 123 percent of the national average. The Riverside-San Bernardino urbanized area 1985 per capita income was 96 percent of the national average (SCAG, 1987).

TABLE 3-6
Per Capita Income: 1982 & 1985

Basin Portion of County	1982	1985
Los Angeles	\$12,303	\$12,737
Orange	13,484	14,865
San Bernardino	10,461	11,386
Riverside	10,387	11,804

Employment

By the year 2010, regional employment is forecast to include 8.9 million jobs (SCAG, 1987), reflecting an annual growth rate of 2 percent. This rate is higher than the rate forecast for the nation as a whole. Employment in Los Angeles County is projected to grow by 1,444,000 jobs by 2010, for a total employment of 5,497,000. Los Angeles County, however, will have the lowest growth rate (1%) in the Basin, due to its already large employment base. Total employment in Orange County by 2010 is forecast to be 1,925,000, reflecting an annual growth rate of 3.2 percent. Riverside County's total employment by 2010 is forecast to be 477,000, an annual growth rate of 3.5 percent. San Bernardino's total employment by 2010 is forecast to be 634,000, reflecting a growth rate of 3.6 percent. Employment and economic benefits are projected to be distributed more evenly throughout the region than at present, with Riverside and San Bernardino Counties capturing greater shares of regional employment.

The trend toward a service-based economy, described in the above section entitled "Employment and Economics", is projected to continue to the year 2000 (SCAG, 1987). Between 2000 to 2010, growth in the service sector is expected to slow down with the annual average increase projected to be 1.9 percent. By 2010, 29.3 percent of the labor force will be employed in the services industry. The downward trend in the manufacturing sector is also expected to continue, with the manufacturing share of employment dropping from 20.5 percent in

1984 to 16.9 percent by 2010. The government sector is projected to remain stable at approximately 10 percent by 2010, and other sectors of the economy are anticipated to maintain their same relative shares of total employment.

Other Existing Settings

Geology and Soil

Folding, tilting, and deformation of the rocks, along with displacement along faults have formed the Basin. Tectonic activity continues along the Basin's coastal edge because of its location along the Pacific plate. The San Andreas fault separates the Pacific plate to the west and the North American plate to the east. These plates are pushing past each other along a transverse fault as the Pacific plate moves northward relative to the American plate.

The Basin is part of two geomorphic provinces: the Transverse Ranges and the Peninsular Ranges. The Transverse Ranges are the only east-west trending mountain range in California and are made up of a complex set of fold-fault mountains composed of metamorphic rock. Two major mountain groups are the San Gabriel and San Bernardino mountains with San Gorgonio as the highest peak, reaching a maximum elevation of 11,500 feet.

The Peninsular Ranges, lies south of the Transverse Ranges and includes Mt. San Jacinto, Santiago Peak, and Toro Peak. Identified as fault-block mountains with steep eastern faces and granitic cores, the ranges are covered with marine terraces of poorly consolidated sedimentary material.

Major soil types found in the Basin are valley, valley-wind modified upland residual, terrace, and lithosol. The categories of rock material include old crystalline basement rock, old modified sedimentary rock, igneous rock, and young continental sedimentary deposits.

Ground Water

Approximately 40 percent of the water used in Southern California is supplied by ground water. There is an estimated 14 million acre feet of usable ground water under the Basin, but less than 1.4 million acre feet can be withdrawn safely without resulting in land subsidence or intrusion of salt water into the fresh water supply. Additionally, local sources of water are expected to decline

as a proportion of the Basin's total water supply because of low annual rainfall and because ground water pollution has forced the closure of a number of wells. In addition to ground water as a water source, local surface water and imported water constitutes the Basin's water demand. Table 3-7 shows by County, the percentage of water supplied by source.

Table 3-7
Basin Water Supplies
(Percentage by Source)

County	Ground	Surface	Imported
Los Angeles	32	1	67
Orange	44	1	55
Riverside	78	3	19
San Bernardino	72	14	14

Source: K. Kunysz, Metropolitan Water District

Surface Water

The major rivers of the area include the Los Angeles River, the San Gabriel River, the Santa Clara River, the Santa Ana River, and the San Jacinto River. The larger lakes and reservoirs are Castaic Lake, Prado Dam Reservoir, Lake Mathews, Lake Elsinore, and the Perris Reservoir. These surface water sources are operated either by MWD or local water agencies.

Over 30 minor streams are spread throughout the Basin. and tend to be intermittent because stream flow on the amount of rainfall. The flow of the Basin's major rivers (Los Angeles, San Gabriel, Santa Ana) is heavily influenced by flood control projects.

Water Supply Systems

Due to the low annual rainfall in the Basin, over half of the water supply is imported. The primary suppliers are the Los Angeles Department of Water and Power, the Metropolitan Water District, and the California Department of Water Resources. Total Basin water consumption in 1987 was slightly over 3 million acre feet (MWD Annual Report, 1987).

The MWD estimates that water demand in the Basin will grow by 24 percent from 1990 to 2010 as shown on Table 3-8. The increased demand for water from population growth is expected to be offset in part by water conservation efforts. Conservation programs by water agencies include lining canals to reduce seepage, leak detection programs in water mains, and promotion of water -saving practices and devices among consumers.

Table 3-8
Projected Total Water Use In the
South Coast Air Quality Management District
(Acre-Feet/Year)

AGENCY	1990	2000	2010
Metropolitan Water District (In AQMD)	2,837,700	3,165,200	3,503,500
Other Water Agencies	276,915	328,940	350,390
TOTALS	3,114,615	3,494,140	3,853,390

Source: K. Kunysz, Metropolitan Water District

Waste Water Facilities

There are approximately 52 publicly owned treatment works (POTW) and one privately owned waste water treatment facility in the Basin. Located in the following sanitation districts, they include: Sanitation Districts of Los Angeles County, City Water District, Las Virgenes Metropolitan Water District, Upper Santa Ana Basin District, Lower Santa Ana Basin District, and the Lahontan District. The EPA has mandated that all POTWs provide at least secondary treatment. Currently, all but three POTWs in the District comply. The three exceptions all have H-301 waivers which allow them to release a mixture of secondary and primary treated water into Basin surface waters.

Six of the Basin's POTW's are scheduled for expansion within the next four years as effluent flow is expected to exceed treatment capacity. Eight POTW's have no expansion plans in the foreseeable future because of complete build-out of the communities they serve, and/or recent capacity expansions (Publicly Owned Treatment Works, SCAQMD, August 1987). The remaining POTW's will eventually need to expand as the communities they serve grow.

Waste Disposal Systems

The Solid Waste Recovery Act of 1972 requires that each county prepare a plan for solid waste management in cooperation with cities, unincorporated areas, private industry, and the general public. Counties are then required to review and revise their solid waste management plans every three years to reflect prevailing conditions and any changes in state policy.

The Los Angeles County Solid Waste Management Plan was prepared by the County Department of Public Works. The Orange County Solid Waste Management Plan was prepared by the County General Services Agency, Waste Management Program Office. The Riverside County Solid Waste Management Plan was prepared by the County Waste Management Department and the San Bernardino County Solid Waste Management Plan was prepared by the Public Works Agency and approved by the Board of Supervisors in January 1986.

Marine Water

The water quality along the coast depends on the amount of tidal flushing, the local water circulation, and the quantity and quality of material discharged in the area. Industrial discharges have been significantly reduced because most POTWs release secondary treated water. Surface runoff and aerial fallout are minor nonpoint sources of particulates, metals, and pesticides. Ocean dumping of a variety of liquid and solid wastes occurs at three EPA-approved sites off the coast.

Marine Biology

The marine flora and fauna off the coast are diverse. The free-swimming organisms consist of approximately 23 invertebrate and 481 vertebrate species.

Shrimp, crabs, octopus, squid, and over 35 species of fish totaling approximately 125,000 tons are caught commercially. Kelp beds provide food and habitat for many species and are also harvested commercially.

Terrestrial Biology

In spite of the large human population in the Basin, some areas contain large, diverse plant and animal communities. The best preserved of these are usually located in isolated, undisturbed areas. Local plant communities are characterized primarily as chaparral, i.e., low scrub vegetation that is drought and fire tolerant. Some mixed hardwood and conifer climax forests remain in the San Gabriel Mountains.

Animals of the Basin have suffered more from mankind's presence than have plants. Most of the larger mammals such as the grizzly bear, mountain bighorn sheep, and the mountain lion, are either completely or nearly extinct in the Basin. There are over a dozen endangered birds, including the Least Tern and the Southern Bald Eagle.

Archaeological and Historical Sites

Based on estimates from the regional archaeological clearinghouses and the State Department of Parks and Recreation, there are over 8,000 known archaeological and historic sites distributed throughout the Basin. Many of the sites have been severely disturbed by urbanization and offer little research value.

Land Use

Despite the population and development intensity that characterizes the greater Los Angeles metropolitan area, 79% of the South Coast Air Basin remains as undeveloped non-urban acreage. Non-urban land encompasses agricultural

land, water bodies, developable vacant land, vacant land unsuitable for development, parks, beaches, cemeteries and other stretches of open space. Approximately 1.17 million acres (31%) of this undeveloped acreage is considered potentially developable.

Urban land uses are concentrated on the coastal plain that covers most of Los Angeles and Orange Counties and extends into the western portions of Riverside and San Bernardino counties. These uses include residential, commercial, industrial, transportation, utility, and institutional property, in both public and private ownership.

Table 3-9 below illustrates this broad-scale distribution of land uses.

Table 3-9
Land Use Acreage in the
South Coast Air Basin, 1980

Land Use Type	COUNTY			
	Los Angeles	Orange	Riverside	San Bernardino
Residential	414,632	125,454	67,995	78,137
Commercial	90,589	33,947	8,706	14,571
Industrial	113,982	35,517	6,781	23,138
Urban	619,203	194,918	83,482	115,846
Developable	787,114	199,204	420,142	145,260
Total	2,531,783	530,217	848,749	880,277

Source: Southern California Association of Governments, 1988.

* Total includes vacant land and land considered undevelopable.

At present, the urbanized portions of Los Angeles, Orange and San Bernardino Counties are 67%, 64%, and 67% residential respectively. Riverside County's current urban area is designated 81% residential. Detailed breakdowns of the above land use statistics reveal few significant land use differences between existing highly urban and urbanizing subregions within the basin. Highly urban

subregions typically have 25% open space, with 50% residential, 11% commercial and 14% industrial land. The developed portion of urbanizing areas thus far replicates this balance among residential, commercial and industrial land uses.

Land Use and Urban Form

The Basin's suburban land use pattern is the result of residents' attempts to optimize single family housing, low density, and convenient access to jobs and shopping. Thus, at a small scale, the Basin is characterized by a low-density mix of residential, commercial and industrial land uses punctuated by employment and service centers composed of more intensive commercial and industrial uses. Local zoning and building codes determine to some degree how well individual jurisdictions in the Basin conform to this overall trend toward an efficient mix of land uses.

Basinwide urban form is the large-scale pattern formed by the aggregate of these local land use allocations. The South Coast Air Basin is characterized by a multi-centered network of retail/employment centers connected by major freeway corridors. These commercial/industrial centers are distributed across the Basin roughly in proportion to population density. The transportation network both helps define and respond to this multi-centered land use arrangement, as centers cannot be sustained without access. Thus, commercial/industrial centers frequently coincide with major freeway destinations or intersections.

Housing

The South Coast Air Basin houses its 11.3 million residents in 4.0 million housing units. Table 3-10 details the units available in each county as of 1984, including both rental and ownership units as well as single- and multi-family units:

Table 3-10
Total Housing Stock in the
South Coast Air Basin, 1984

County	1980	Percent of Total	1984	Percent of Total	1988*	Percent of Total
Los Angeles	2,618,923	68	2,923,560	69	3,082,700	64
Orange	720,984	19	760,084	18	829,400	17
Riverside	197,105	5	203,566	5	410,200	9
San Bernardino	294,596	8	323,556	8	504,000	10
Basin Total	3,831,608		4,210,766		4,826,300	

Source: Southern California Association of Governments, 1988.

* Total county figures include eastern portions of San Bernardino and Riverside Counties outside the Basin.

Los Angeles County contains more than two-thirds of the Basin's houses, slightly less than its 70% share of population. Riverside and San Bernardino Counties are presently experiencing the greatest housing production activity in the Basin, due to the availability of land and lower construction costs.

Future Housing Projections

The Basin's housing stock is expected to increase 52% by 2010 in order to keep pace with population growth and diminishing household size. Added housing units will be distributed more heavily to inland areas, as illustrated in Table 3-11 below:

Table 3-11
Projected Future Housing Stock, 1984-2010

County	1984	Percent of Basin	2010	Percent of Basin	Percent Increase
Los Angeles	2,923,560	69	3,835,386	60	31
Orange	760,084	18	1,223,789	19	61
Riverside	203,873	5	574,400	9	174
San Bernardino	323,556	8	752,600	12	137
Basin Total	4,211,073		6,386,175		52

Source: Southern California Association of Governments, Draft Growth Management Plan, April 8, 1988.

These estimates show that, despite construction of more than 900,000 housing units over the twenty-five year period, Los Angeles County's share of the Basin's housing stock will decline 9% as new construction increases in the other three counties. In the older, developed portions of the Basin, the cost of adding housing units will be higher due to the scarcity of developable residential land and the expenses associated with recycling and redevelopment to make new units possible. Thus, housing growth will gravitate toward areas where land is more readily available and less costly, in relative terms.

Household Size

Household size describes the intensity with which housing stock is used. Average household size varies among counties within the Basin. Orange County has the largest household size, with an occupancy factor of 2.72 persons per dwelling unit. Los Angeles, Riverside, and San Bernardino counties have average household sizes of 2.68, 2.63, and 2.54 persons per unit respectively. Household size is projected to decrease significantly throughout the Basin by the year 2010. SCAG's future housing projections indicate that household size will fall to 2.59 person per unit in Los Angeles County, 2.49 in Orange County, 2.44 in Riverside County and 2.32 in San Bernardino County, even as

population increases. This dip reflects an overall decline in average family size, the needs of an aging population, and smaller units due to declining availability and higher costs for residential land.

Housing Needs

California state law requires the Southern California Association of Governments to identify both existing and future housing needs in the Basin counties every five years. The current draft Regional Housing Needs Assessment (Southern California Association of Governments, April 7, 1988) defines housing need in terms of "the number of lower income households [80% of the county median] paying more than 30% of their income for housing." Future housing needs are projected based on the number of added units needed to accommodate forecasted growth within each jurisdiction within the Basin. As required by state law., the Housing Needs Assessment does not take into account any housing provision limitations due to city growth control measures. Further, the Regional Housing Needs Assessment attempts to reverse impacts on low income households within communities seeking an equitable regional distribution of lower income households.

In addition, SCAG estimates that jurisdictions within the Air Basin will need to construct 15.6% of their added housing stock through 1994 for very low income households, 21.3% for low income households, 19.9% for moderate income households, and 43.2% for upper income households in order to meet housing needs, avoid impacts of low income households, and create ideal vacancy rates in the housing stock.

Table 3-12 summarizes the estimated current housing needs within the Air Basin:

Table 3-12
Estimated Current Low Income Housing Needs,
1987 and 1994

County	1987	Percent of Basin
Los Angeles	608,597	72
Orange	121,208	14
Riverside*	48,798	6
San Bernardino*	66,487	8
Basin Total	845,090*	100

Source: Southern California Association of Governments, Draft Regional Housing Needs Assessment, April 7, 1988.

* Includes non-Basin portion of Counties.

Major Energy Systems

The Los Angeles Department of Water and Power and the Southern California Edison Company are the major suppliers of electricity in the South Coast Air Basin. Other significant suppliers are the municipal utilities of the cities of Burbank, Glendale, and Pasadena. The Southern California Gas Company is the major supplier of natural gas in the Basin.

Public Services

The main public services provided in the Basin are police, fire protection, sanitation, pest abatement, education, recreation, streets, storm drains, street lights, water, mass transit, and public health. These services are provided either by special districts or by city, county, or state agencies.

Transportation

There is an extensive network of highways and surface streets in the Basin. Major freeways include: the Santa Monica Freeway/San Bernardino Freeway (Route 10), the Santa Ana Freeway (Route 5), the Harbor/Pasadena Freeway (Route 110), the Hollywood/Ventura Freeway (Route 101), the Long Beach Freeway (710), Pacific Coast Highway (Route 1), the Artesia Freeway (Route 91), and the Foothill Freeway (Route) In 1987, over 9 million vehicles were registered in Los Angeles, Orange, San Bernardino, and Riverside Counties.

Congestion on many of the freeways, particularly during the morning and evening peak hours, is significant. Many of the freeways in Los Angeles and Orange counties operate at average speeds of under 37 miles per hour during the rush hours. Congestion, in turn, leads to increased gasoline consumption and air pollution emissions. In the four-county area, it is estimated that over 5 billion gallons of gasoline were sold in the Basin in 1987 (California Department of Transportation, 1987).

There are three major transportation commissions which assist in planning regional transportation needs: the Los Angeles Transportation Commission, the Orange County Transportation Commission, and the Riverside Transportation Commission. In addition, the Southern California Association of Governments plays a major role in preparing the Regional Mobility Plan which provides an overall blueprint for development of the regional transportation system.

In 1987, the two primary transit districts in the Basin (Southern California Rapid Transit District and Orange County Transit District) carried more than 522 million passengers.

The Basin is served by three major railroad companies: Southern Pacific, Union Pacific, and Santa Fe. The Basin also has many small airports along with the five major airports that serve the region: Los Angeles International, Burbank-Glendale-Pasadena, John Wayne (Orange County), Ontario International, and Long Beach Municipal Airports.

CHAPTER 4

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Air Quality Impacts

Water Impacts

Impacts on Plant Life

Impacts on Animal Life

Noise Impacts

Light and Glare Impacts

Impacts on Land Use

Natural Resource Impacts

Risk of Upset

Impacts on Population

Housing Impacts

Transportation and Circulation Impacts

Impacts on Public Services

Energy Impacts

Impacts on Utilities

Impacts on Recreation

Human Health Impacts

Economic Impacts

Impacts on the Earth

Aesthetic Impacts

Archaeological/Paleontological/Historical Impacts

SECTION 4-1

AIR QUALITY

Air Quality Benefits of the AQMP

AQMP Control Measures

Tier I Control Measures

Tier II Control Measures

Tier III Control Strategy

AIR QUALITY BENEFITS OF THE AQMP

Implementation of the AQMP will provide substantial air quality benefits as is its purpose. Benefits expected to result from reductions in criteria pollutant emissions by Tier I, Tier II and Tier III control measures have been estimated using air quality models. Modeling was conducted for ozone, PM₁₀, nitrogen dioxide (NO₂) and carbon monoxide (CO). Air quality models used represent state-of-the-science techniques for modeling in the South Coast Air Basin (Basin). Basin-wide criteria pollutant emissions were estimated for the following four scenarios:

Baseline Emissions - Emissions if no AQMP control measures are implemented

Tier I Emissions - Emissions after implementation of Tier I control measures

Tier II Emissions - Emissions after implementation of Tier II control measures

Tier III Emissions - Emissions after implementation of Tier III control measures

For each emissions scenario, air quality models were applied for the years 1985, 2000 and 2010. All four emissions scenarios were adjusted to account for growth or changes in source characteristics for each year studied. Examination of model results allows for a detailed assessment of air quality benefits that can be realized by implementation of the AQMP. A discussion of modeling techniques and results is provided in the following subsections. Results are discussed primarily in terms of the following six emissions/year combinations: Baseline emissions for 1985, 2000 and 2010, and Tier I, Tier II and Tier III control measures for the year 2010.

Ozone

Ozone is formed in the atmosphere through a complex series of chemical reactions involving, primarily, nitrogen oxides (NO_x) and reactive organic gases (ROG) in the presence of sunlight. Control strategies for reducing ozone must involve careful consideration of the nonlinear relationship between NO_x and ROG. Depending on ROG to NO_x ratios and the area of study, it is possible that a decrease in NO_x emissions can increase ozone while an increase in NO_x emissions can potentially have the opposite effect. Also, the reactivity profile of ROG' is important in the ozone formation process.

Ozone concentrations exceed both Federal and California air quality standards throughout the Basin. In fact, ozone concentrations in the Basin are higher than anywhere in the United States. Therefore, it is critical that effective control measures be implemented to improve ozone air quality in the Basin.

Effectiveness of the various control strategies on reducing ambient ozone was assessed using the Urban Airshed Model (UAM). The UAM is a complex photochemical model that is used to predict the effect of NO_x and ROG emissions on ozone air quality. With assistance from Systems Applications, Inc, (SAI), ARB and EPA, the District developed the input data and evaluated the model for a specific ozone episode (June 5-7, 1985) for which a comprehensive meteorological data set was available. This episode period was evaluated with three other episode periods and was determined to represent the worst-case conditions for evaluating control strategies. The model was applied to this episode period to determine future ozone levels in the years 2000 and 2010 for the baseline emissions case and for the year 2010 for the Tier I, Tier II and Tier III control scenarios. Results of these UAM runs, as well as those derived from a number of sensitivity runs, were used to formulate additional control scenarios. The model was then applied to demonstrate the effectiveness of these control scenarios in achieving compliance with Federal and California ozone standards.

A specific modeling protocol was established for the AQMP and is described in Appendix V-Q of the AQMP. This protocol sets forth criteria for acceptability of model performance. Model performance for the June 5-7, 1985 episode met or exceeded all criteria specified in the protocol. Model performance is documented in Appendix V-R of the AQMP. A model run using zero emissions was made to test the sensitivity of initial and boundary

using zero emissions was made to test the sensitivity of initial and boundary conditions used as model input for this episode. A maximum ozone concentration of 0.06 ppm was predicted for this case. Differences in the range of initial and boundary conditions were found to be insignificant, with less than a 0.01 ppm difference occurring between the high and low cases.

Basin-wide emissions, peak predicted ozone concentrations, and average per capita exposure are shown in Table 4-1.1 for baseline emissions in all three years of study and for all three control scenarios in 2010. Peak concentrations at each of five Basin locations are shown in Figure 4-4.1.

Table 4-1.1
Basin-wide Precursor Emissions and
Model-Predicted Ozone concentrations
and Exposure for Different Control Scenarios

Scenario	Episode-Specific Emissions (tons/day)		Peak Ozone Concentration (pphm)	Basinwide Average Per - Capita Exposure (pphm - hour)	
	ROG	NOx		> 12 pphm	> 20 pphm
1985 Baseline	1423	1063	36.0	13.8	3.45
2000 Baseline	1138	948	29.1	8.8	1.53
2010 Baseline	1221	1056	29.8	11.8	2.21
2010 with Tier I Control	627	470	20.4	3.6	0.01
2010 with Tier II Control	401	312	16.6	1.3	0.00
2010 with Tier III Control	200	195	12.6	0.0	0.00

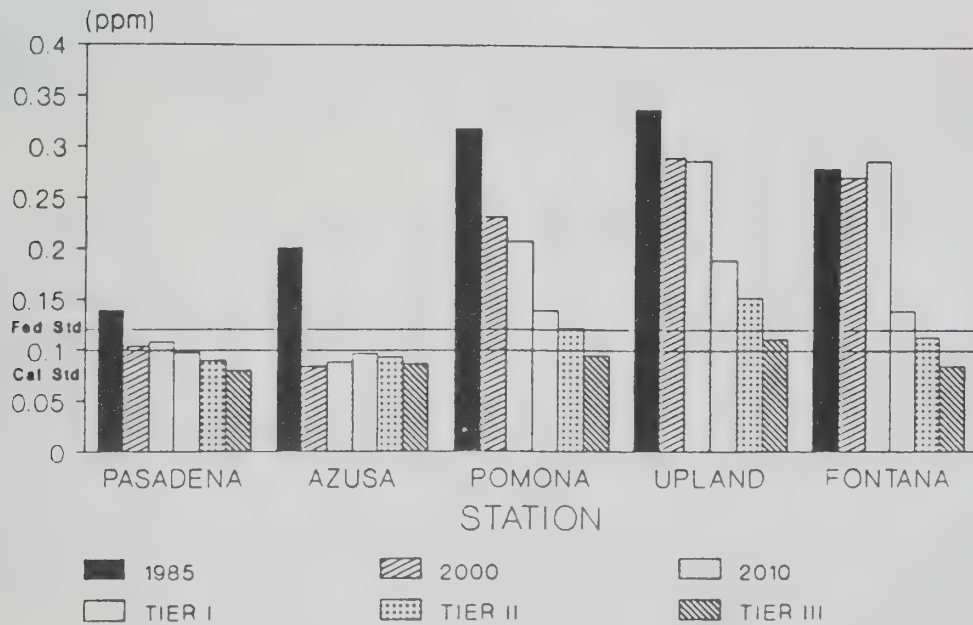
- These emissions data are for the June 5-7, 1985 episode and are not the same as those for an annual average day as shown in Chapters 3 and 4.

As shown in Table 4-1.1, peak baseline ozone concentrations were found to decrease by about .07 pphm between 1985 and 2000, and to increase slightly above the 1985 level by 2010 in response to emissions growth in the latter ten-year period. Although Basin-wide ozone is reduced by approximately 6 pphm between 1985 and 2010, there is an indication of a significant shift in the overall distribution of baseline concentrations during this period.

Counties while increases are evident in the San Bernardino and Riverside Counties portion of the Basin as well as in the western portions of Los Angeles and Orange Counties. In terms of average per capita exposure, about a 55 percent decrease is seen to occur between 1985 and 2010 relative to 0.20 pphm reference level.

Figure 4-1.1 indicates that, with Tier III controls, Federal ozone standards will be met in 2010 under the worst-case conditions modeled. This finding is due to emissions decreases of 84 percent for ROG and 80 percent for NO_x. Failure to meet California standards with these rather large emissions decreases can be attributed to the severe meteorological conditions that can occur in the Basin. The comparisons among the baseline and control scenarios for 2010, as shown in Table 4-1.1, indicate that implementation of control measures would provide significant air quality improvement in terms of peak concentrations as well as per capita exposure. Reductions in peak concentrations would be 32 percent for Tier I controls, 44 percent for Tier II controls and 58 percent for Tier III controls. Exposure levels would also be greatly reduced. Tier II controls would result in zero exposure to Stage I episode conditions (i.e. 0.20 ppm) and Tier III will eliminate standard exceedances. All UAM runs conducted in assessing impacts of the various scenarios are summarized in Appendix V-S of the AQMP.

Figure 4-1.1
Maximum Hourly Ozone Concentration Projections
in the South Coast Air Basin



PM₁₀ is the portion of total particulate matter that is less than 10 microns in diameter. PM₁₀ in the atmosphere is made up of both primary (directly emitted) particles and secondary particles formed in the air through chemical reactions involving, primarily, nitrogen oxides (NO_x), sulfur oxides (SO_x) and reactive organic gases (ROG) as PM₁₀ precursors. Twenty-four hour and annual air quality standards were promulgated in California in 1982 and nationwide, by the U.S. Environmental Protection Agency (EPA), in July 1987. In both cases, 24-hour and annual standards for total suspended particulates (TSP) were replaced by standards for PM₁₀.

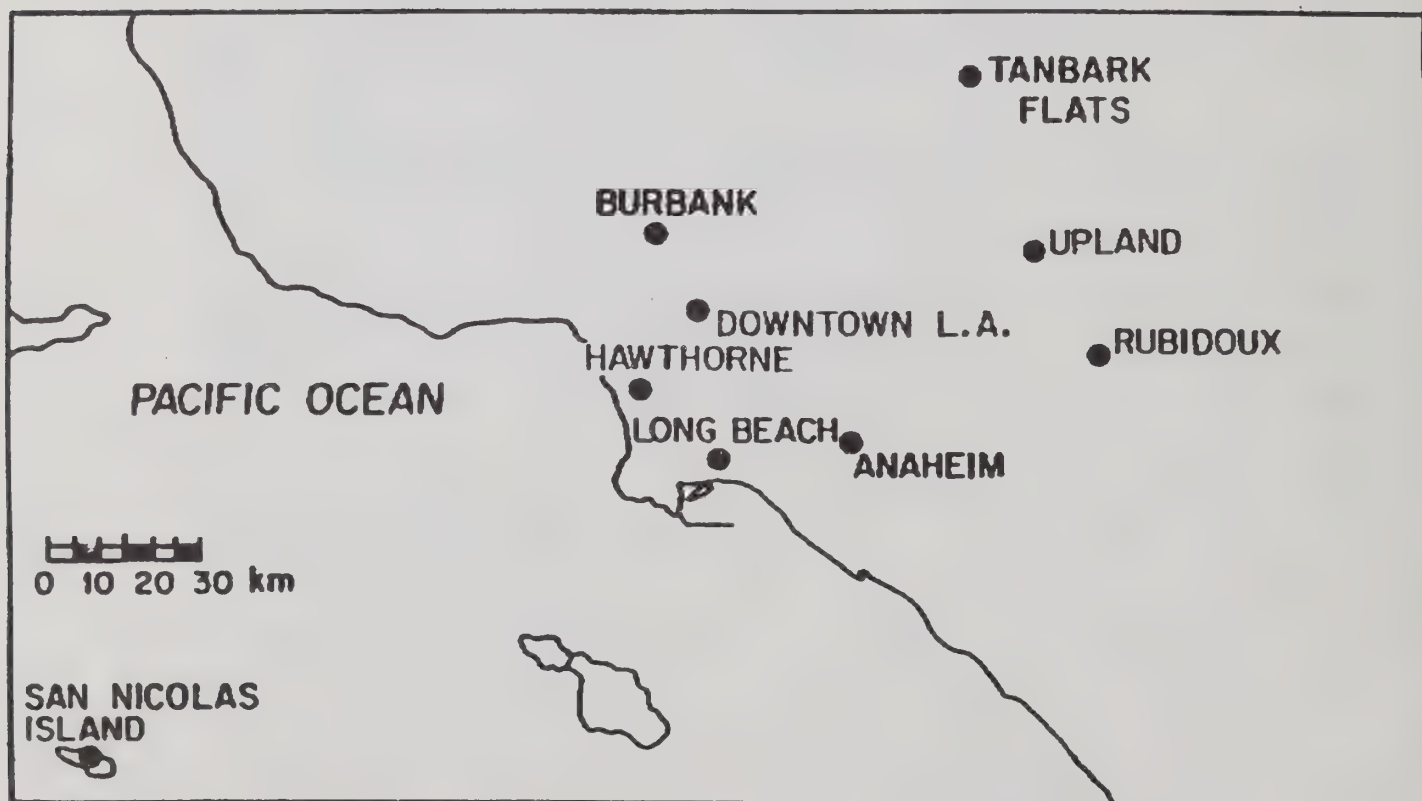
The South Coast Air Basin has been classified by the EPA as a PM₁₀ Group I area. This means that the Basin is judged to have a probability of 95 percent or greater of not complying with Federal PM₁₀ standards. A recent analysis of PM₁₀ data collected in 1986 confirms that federal standards are exceeded in the Basin. This analysis is described in Appendix V-H of the AQMP. Table 4-1.2 shows results of the 1986 program at eight locations as well as at San Nicholas Island, about 70 miles offshore of the Basin. Station locations are shown in Figure 4-1.2. San Nicholas Island was included to establish background air quality. The contribution of directly emitted particles to ambient PM₁₀ was determined by the Chemical Mass Balance (CMB) receptor model. This technique involves comparing chemical profiles of PM₁₀ ambient measurements to chemical source profiles to determine the relative contribution of various source types. A particle-in-cell Lagrangian type model was used to apportion sources of secondary PM₁₀ species, including sulfates and nitrates. This model involves simulating emissions at the various sources and tracking dispersion and chemical transformation in the ambient air. These modeling techniques were used with emissions projections to estimate PM₁₀ air quality for the various emission scenarios and years of study. Detailed information on the data gathering and modeling analysis for PM₁₀ is given in Appendices V-B through V-O of the Draft AQMP.

Table 4-1.2
ANNUAL AVERAGE AND 24-HOUR MAXIMUM PM₁₀ MASS
CONCENTRATIONS
THROUGHOUT THE SOUTH COAST AIR BASIN IN THE
GREATER LOS ANGELES REGION, 1986.

Site	Annual Average PM10 Mass (ug m ⁻³)		Highest 24-h PM ₁₀ Mass		2nd Highest 24-h PM ₁₀ Mass		Percent of Days Greater than the 24-h Standard		Number of Sampling Events in Average
	Arithmetic Mean	Geometric Mean	(ug m ⁻³)	Date	(ug m ⁻³)	Date	Federal (150ug m-3)	State of California (50ug m-3)	
Burbank	56.6	51.2	187	Dec. 4	138	Jan. 2	1.6	54.1	61
Downtown LA	60.2	55.5	187	Dec. 4	122	Jan. 2	1.7	66.1	59
Hawthorne	47.0	42.9	146	Dec. 4	106	Dec. 28	0	26.7	60
Long Beach	51.9	48.0	131	Mar. 27	130	Dec. 4	0	39.3	56
Anaheim	52.1	47.5	130	Dec. 4	121	Mar. 27	0	34.4	61
Rubidoux	87.4	75.5	299	Oct. 29	225 ^h	Nov. 16	9.8	80.3	61
Upland	58.0	50.7	209	Oct. 29	188	Jan. 2	5.0	56.7	60
Tanbark Flats ^f	32.4	26.9	75.1	Oct. 29	66.4	Jan. 20	0	20.8	53
San Nicolas ^g	20.8	17.4	84.8	Jan. 26	61.0	Feb. 25	0	5.2	58

- The federal annual primary and secondary PM₁₀ standards are both 50 ug m⁻³ arithmetic mean (1).
- The State of California's annual primary PM₁₀ standard is 30 ug m⁻³ geometric mean (3).
- The federal 24-h primary and secondary PM₁₀ standards are both 150 ug m⁻³ with no more than one expected excursion above the value per year (1).
- The State of California's 24-h primary PM₁₀ standard is 50ug m⁻³ with no measured values allowed above that level (3).
- The maximum number of sampling events in 1986 was 61.
- Located in the San Gabriel Mountains, north of San Dimas, at an elevation of 870m.
- A background site, located approximately 110 SW of the Los Angeles coastline.
- The chemical material balance on this day does not come close to explaining the gravimetrically determined mass concentration, and therefore this data point may be incorrect. The next lowest day at Rubidoux was 170 ug m⁻³ on January 2, 1986.

Figure 4-1.2
Annual average and 24-hour maximum PM₁₀ mass concentrations
throughout the South Coast Air Basin in the
greater Los Angeles region, 1986.



The annual average PM_{10} air quality projection in the SCAB is shown in Figure 4-1.3 for the six scenarios described above at five sites in the Basin. A similar projection for 24-hour air quality is shown in Figure 4-1.4. Both Federal and California air quality standards for PM_{10} are indicated in both figures. Under the baseline scenarios, standards for either averaging time are not met at any of the sites during any of the years of study. In fact, PM_{10} air quality is shown to deteriorate somewhat between 1985 and 2000 and also between 2000 and 2010 when no new control measures are required beyond those currently in effect. Modeling results indicate that implementation of Tier I control measures would significantly improve PM_{10} air quality in the year 2010 as compared to baseline projections. Federal standards would be met at Long Beach and Los Angeles but would still be exceeded at Burbank (24-hour standard only), Ontario and Rubidoux. California standards would still be exceeded at all five sites. Further reductions via Tier II control measures would bring all sites into compliance with Federal standards by the year 2010. The California annual standard would be met or nearly met at Long Beach, Los Angeles and Burbank but not at the two east Basin sites. All sites would still fail to comply with the California 24-hour standard. Further, though less significant, air quality improvement would be realized at all sites with Tier III controls. However, the annual California standard would still not be met at Ontario or Rubidoux and the 24-hour California standard would not be met at any of the five sites. Compliance with the California 24-hour standard would be very nearly realized at the coastal Long Beach site.

Figure 4-1.3
Annual Average PM₁₀ Air Quality Projection
in the South Coast Air Basin

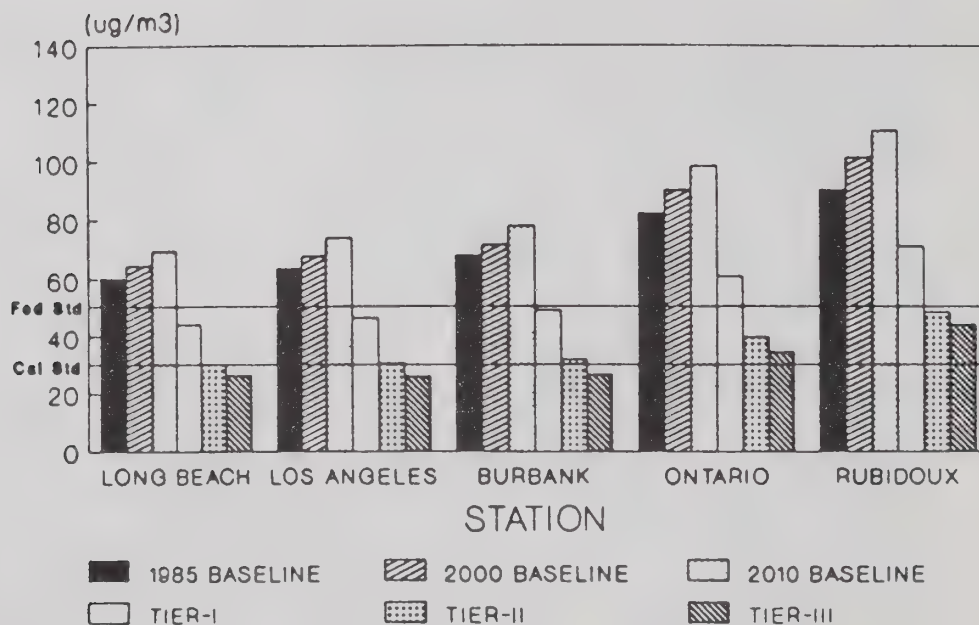
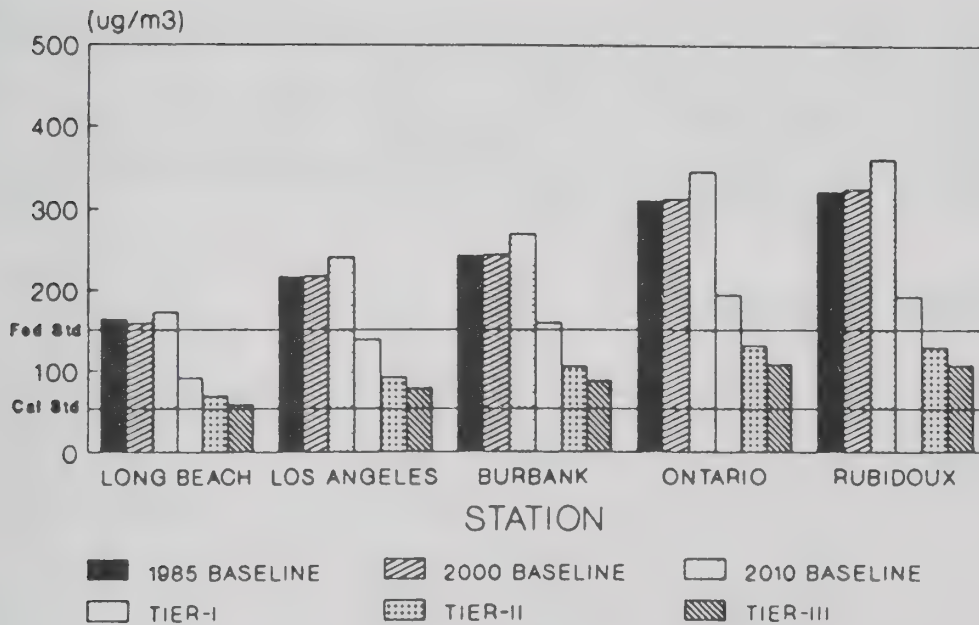


Figure 4-1.4
Maximum 24-Hour PM₁₀ Air Quality Projection
in the South Coast Air Basin



Modeling results in Figures 4-1.3 and 4-1.4 show that significant improvements to PM_{10} air quality can be accomplished through implementation of AQMP proposals. Federal standards can be met Basin-wide if Tier I and Tier II control measures are implemented. The much more stringent California standards would not be met in the Basin, with the possible exception of Long Beach and similar areas, even with Tier III controls included. However, maximum PM_{10} concentrations throughout the Basin would generally be about one-third those in the baseline case if control measures extend to Tier II or Tier III.

Carbon Monoxide

Approximately 90 percent of CO in the Basin is emitted by mobile sources. Unlike ozone, high CO concentrations are generally in the areas of highest emissions. Table 4-1.3 shows 1985 CO air quality at locations throughout the Basin served by monitoring stations. These locations are shown in Figure 4-1.5. Air quality standards are exceeded most frequently in coastal and central Los Angeles County and not at all in the inland areas. Eight-hour standards (both Federal and California) are exceeded more often than one-hour standards. Of the four applicable standards, only the Federal one-hour standard is not exceeded in the Basin.

Table 4-1.3
1985 Carbon Monoxide Quality

Station	Peak Conc.		No. of exceedances			
			Fed. Std.		Cal. Std.	
	1-hr	8-hr	1-hr	0-hr	1-hr	8-hr
Coastal L.A.						
West L.A.	15	10.1	0	3	0	4
Lennox	29	23.5	0	58	30	77
Hawthorne	26	20.6	0	19	7	20
Long Beach	19	13.7	0	9	0	10
Central L.A.						
Los Angeles	14	9.1	0	1	0	2
Lynwood	33	27.1	0	44	45	53
Coliseum	19	9.7	0	4	0	4
Burbank	21	11.6	0	10	3	20
Reseda	16	12.1	0	17	0	11
San Gabriel Valley						
Pasadena	17	9.9	0	3	0	3
Whitter	18	12.4	0	4	0	5
Azusa	9	4.9	0	0	0	0
Pico Rivera	19	11.0	0	0	0	6
Pomona	12	7.4	0	4	0	0
Orange County						
Anaheim	19	15.4	0	3	0	5
El Toro	10	7.7	0	0	0	0
Costa Mesa	10	10.3	0	5	0	6
La Habra	22	1.7	0	5	3	7
Inland Areas						
Upland	10	8.3	0	0	0	0
Fontana	5	4.0	0	0	0	0
Rubinoux	8	5.7	0	0	0	0
San Bernardino	9	5.3	0	0	0	0
Total	33	27.1	0	198	88	233

Note:
State Standard
1-hr average: 20.0 ppm
8-hr average: 9.0 ppm

Federal Standard
1-hr average: 35.0 ppm
8-hr average: 9.5 ppm

A spatial linear rollback modeling approach was used to evaluate CO air quality for Tier I, Tier II and Tier III control scenarios. This model assumes that ambient concentrations above background are directly proportional to the emissions in the immediate area. The rollback technique was used to assess future air quality because of the relationship between emissions and local air quality. This relationship exists because CO is relatively inert, emitted mostly at ground level from mobile sources and is distributed homogeneously within a scale of a few kilometers. In order to perform the CO modeling analysis, the Basin was divided into 5 km by 5 km grid cells to account for the spatial variation of emissions. Only grid cells containing one of the 22 monitoring stations shown in Figure 4-1.5 were used in the calculations. Daily emissions in each of the 22 cells of interest were used in the rollback calculation. Concentrations for each control scenario were calculated in the rollback model by using future year emissions for the given scenario in addition to 1985 emissions.

Figure 4-1.5
CO Air Quality Monitoring Stations

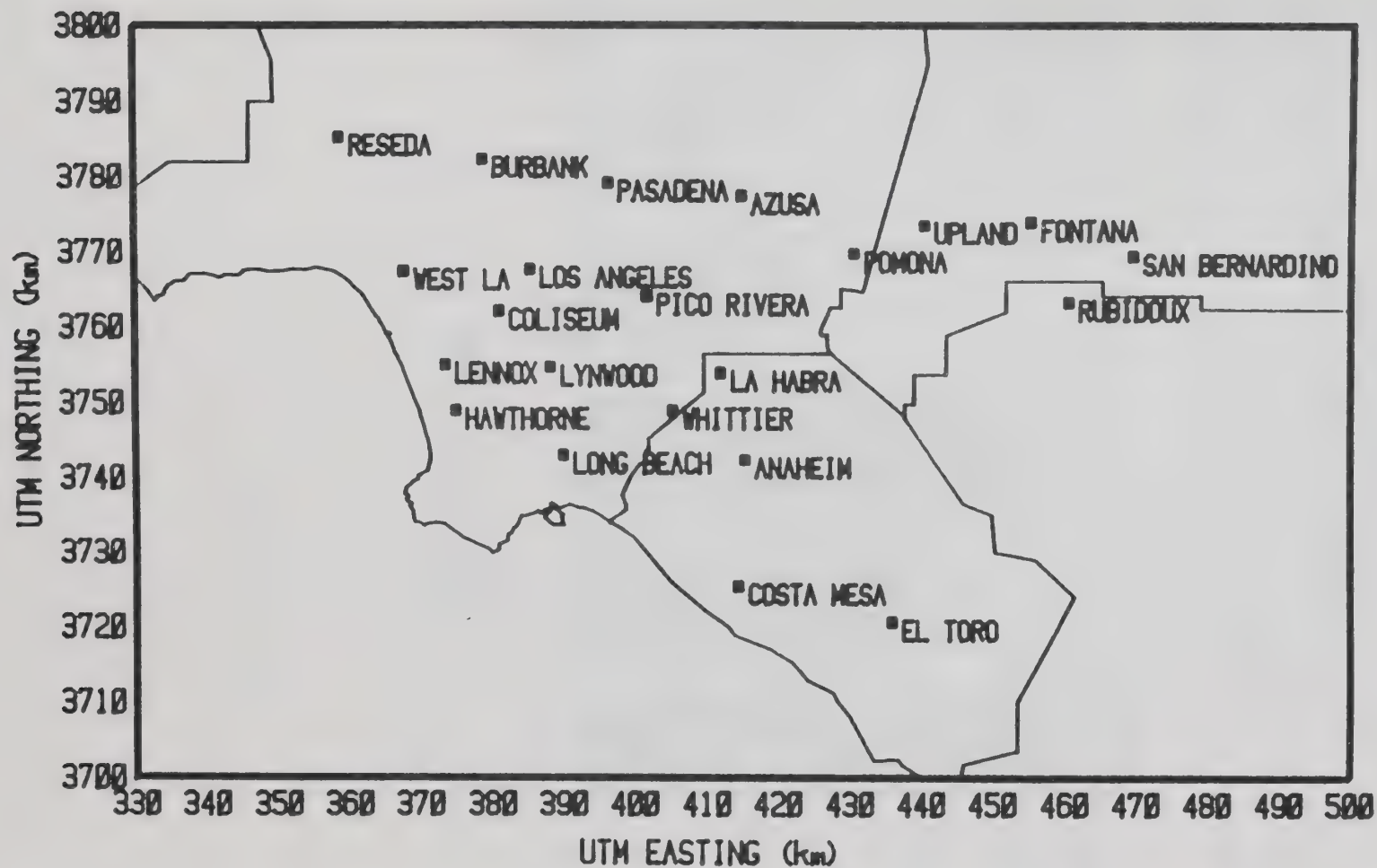


Figure 4-1.6
Projected CO Emissions
for Stationary and Mobile Sources

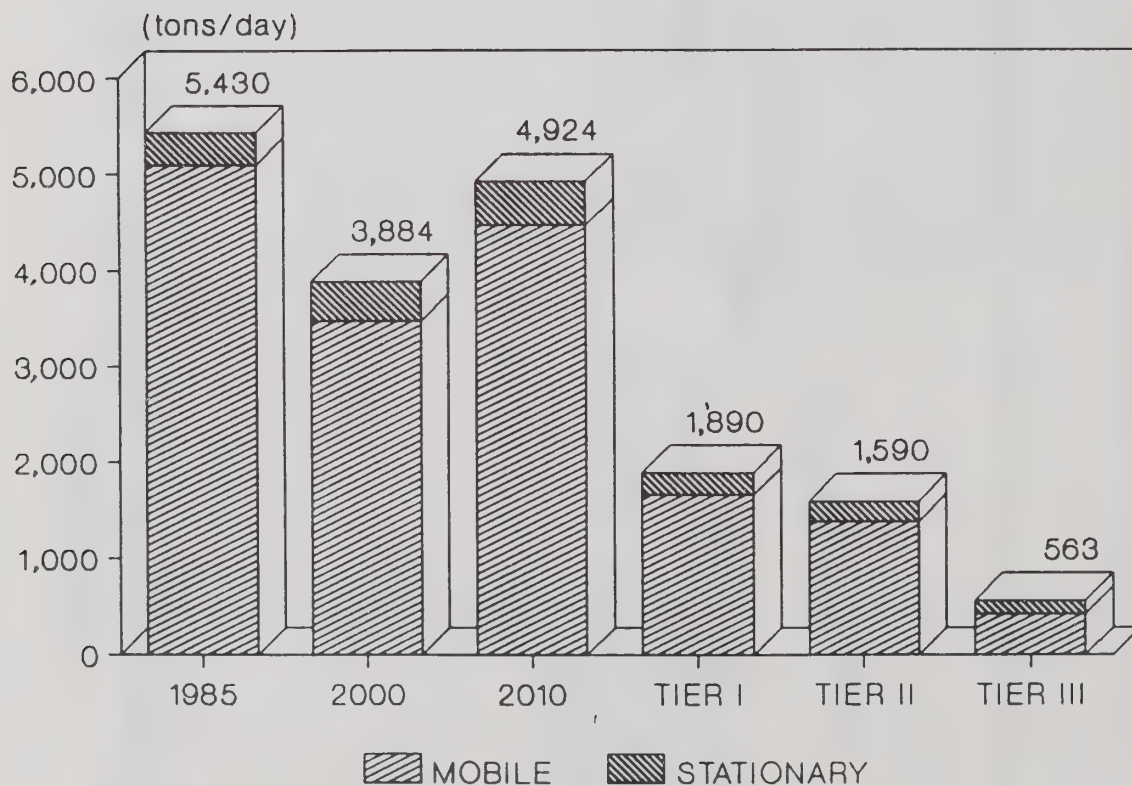


Figure 4-6.1 shows Basin-wide baseline emissions for 1985, 2000, and 2010 as well as Tier I, Tier II, and Tier III emissions for 2010. Under present control requirements, an overall emissions decrease of 9 percent would occur between 1985 and 2010. A greater decrease would be achieved in 2000 but would be largely erased by 2010 due to growth. Compared to 2010 baseline emissions, decreases of 62 percent, 68 percent and 89 percent are projected for Tier I, Tier II and Tier III, respectively.

Projected air quality at SCAB monitoring stations is shown in Table 4-1.4 for each scenario relative to the eight-hour standards. The eight-hour standards are addressed here rather than the one-hour standards because they were found to be the more stringent. With baseline emissions, violations of both Federal and California standards would be eliminated at most stations in both 2000 and 2010. The worst problem would be in Pomona where 44 exceedances of the California standard and 31 exceedances of the Federal standard are predicted for 2010. Tier I controls would be sufficient to eliminate all exceedances of both Federal and California standards in 2010. Compliance is actually projected by 2000. The peak eight-hour CO concentration under Tier I controls is predicted to occur in Lynwood and would be 76 percent of the California standard. Further improvements would occur if CO controls were extended to Tier II or Tier III. Results of CO modeling are detailed more fully in Appendix V-T of the AQMP.

Table 4-1.4
Projected Frequency of Exceedances and
maximum concentration
(8-Hour Average)

STATION	NO. OF EXCEEDANCES						MAXIMUM CONCENTRATION (ppm)					
	STATE			FEDERAL						TIER-I	TIER-II	TIER-III
	1985	2000	2010	1985	2000	2010	1985	2000	2010			
Coastal L.A.												
West L.A.	4	0	0	3	0	0	10.1	4.3	4.5	1.7	1.2	0.4
Lennox	77	6	9	58	5	6	23.5	13.0	13.9	5.7	3.8	1.7
Hawthorne	20	1	2	19	1	1	20.6	10.2	9.6	5.0	3.5	1.6
Long Beach	10	0	0	9	0	0	13.7	8.0	8.2	4.0	3.0	1.5
Central L.A.												
Los Angeles	2	0	0	1	0	0	9.1	3.9	4.4	1.6	1.1	0.4
Lynwood	53	7	8	44	6	6	27.1	12.5	12.7	6.8	5.0	2.5
Coliseum	4	0	0	4	0	0	9.7	4.7	4.6	1.9	1.3	0.5
Reseda	11	0	0	10	0	0	12.1	6.1	7.2	2.8	1.9	0.6
Burbank	20	0	0	17	0	0	11.6	8.2	8.5	3.3	2.3	0.8
San Gabriel Valley												
Pasadena	3	0	0	3	0	0	9.9	4.6	5.8	2.0	1.4	0.4
Whittier	5	0	0	4	0	0	12.4	6.2	7.6	2.8	1.9	0.5
Azusa	0	0	0	0	0	0	4.9	4.4	6.1	1.1	0.8	0.2
Pomona	0	0	44	0	0	31	7.4	6.4	10.6	2.3	1.7	0.7
Pico Rivera	6	0	1	4	0	1	11.0	7.1	9.3	2.4	1.7	0.4
Orange County												
Anaheim	5	1	1	3	1	1	15.4	9.1	9.5	3.5	2.5	0.8
El Toro	0	1	2	0	1	1	7.7	9.2	9.8	4.9	3.4	0.8
Costa Mesa	6	0	0	5	0	0	10.3	7.8	8.1	2.8	2.0	0.7
La Habra	7	0	0	5	0	0	11.7	7.8	8.5	3.2	2.3	0.6
Inland Areas												
Upland	0	0	0	0	0	0	6.3	5.6	7.3	1.9	1.3	0.5
Fontana	0	0	0	0	0	0	4.0	4.8	6.1	1.8	1.3	0.7
Rubidoux	0	0	0	0	0	0	5.7	5.5	7.7	1.7	1.3	0.6
San Bernardino	0	0	0	0	0	0	5.3	3.8	4.3	1.8	1.3	0.5
Basinwide	233	16	67	189	14	47	27.1	13.0	13.9	6.8	5.0	2.5

* State 8-hour average standard is 9.0 ppm.
Federal 8-hour average standard is 9.5 ppm.

Nitrogen Dioxide

Nitrogen dioxide is emitted partially as a primary pollutant but is primarily formed in the atmosphere from nitric oxide (NO), its precursor. Conversion of NO to NO₂ is caused by some of the same chemical reactions that are important in the formation of ozone. By far the largest contributor to SCAB NO_x emissions is on-road mobile sources. In 1985, this category is estimated to have contributed about 60 percent to Basin-wide emissions.

The Basin is currently the only area in the United States that is not in compliance with the Federal annual NO₂ standard. Nevertheless, much improvement has been made over the past decade in complying with this standard. In 1987, the Federal standard was exceeded at only two monitoring stations in the Basin - Pomona and downtown Los Angeles. The highest concentration, 0.0547 ppm, was recorded in Pomona. This reading is only 2.4 percent above the standard of 0.053 ppm.

The District reviewed and rejected a number of available NO₂ modeling alternatives. Although each alternative has previously been used successfully in other situations, the demonstrations required for the AQMP analysis were not met in any of them due to various shortcomings involving both chemical and physical considerations. In view of the limitations identified in the available models, the District developed a new modeling approach that incorporates features that are important to consider for the AQMP. A description of the model is provided in Appendix V-A of the AQMP.

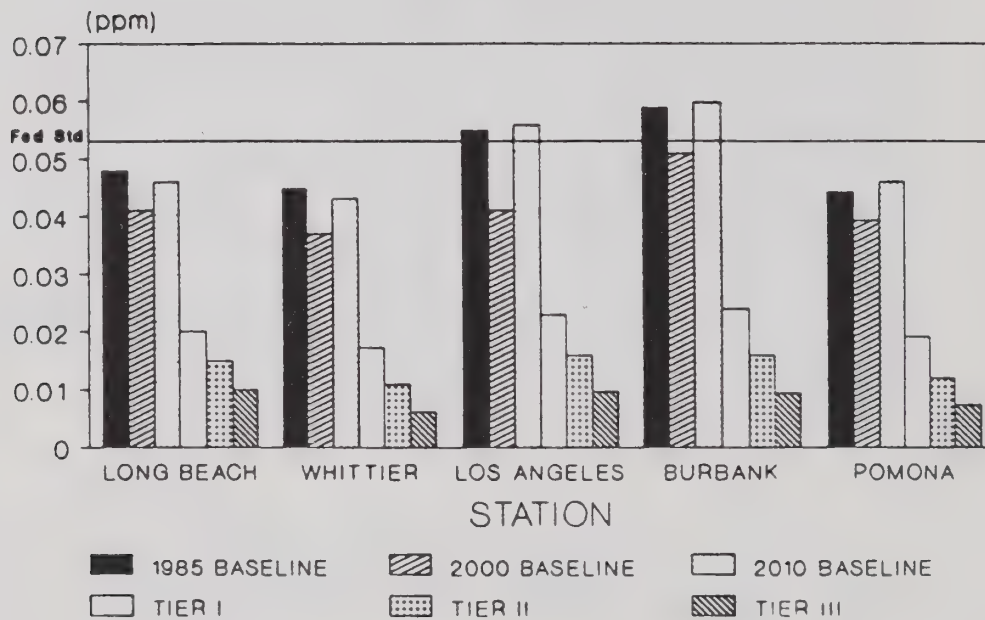
Table 4-1.5 shows estimated baseline NO_x emissions in 1985, 2000 and 2010 and estimated emissions in 2010 for Tier I, Tier II and Tier III control scenarios. The dominant source category in all cases is on-road mobile sources. Baseline emissions are reduced in 2000 over 1985 levels because of existing controls. However, by 2010 emissions are expected to increase to 1985 levels because of continued growth. Relative to 2010 baseline emissions, reductions of 58 percent, 70 percent and 80 percent are estimated for Tier I, Tier II and Tier III control levels, respectively.

Table 4-1.5
Estimated NO_x Emissions in 1985, 2000,
2010 With Tier I, Tier II, and Tier III

CATEGORY	1985	2000	2010	TIER I	TIER II	TIER III
On-Road Mobile Sources	620.57	478.84	572.16	231.17	148.34	69.65
Residential Space Heating	13.57	13.75	15.54	4.10	4.10	4.10
Residential Water Heating	12.27	9.03	10.20	3.96	3.96	3.96
Refinery Boilers and Heat	38.45	24.61	24.61	2.77	1.66	0.0
Utility IC Engines	3.69	4.16	4.15	1.07	1.07	1.07
Non-Utility IC Engines	84.66	39.20	40.27	3.23	3.23	3.23
Refinery FCC Units	8.40	5.61	5.79	0.49	0.29	0.0
Cement Kilns	7.86	6.63	6.82	5.12	5.12	5.12
Glass Melting Furnaces	8.76	4.72	4.90	3.68	3.68	3.68
Non-Farm Equipment	14.39	17.32	18.77	18.77	13.14	27.67
Railroads	20.96	33.01	39.50	10.73	4.23	4.23
Commercial Jet & PVT AIRC	11.43	14.89	16.76	3.94	3.94	3.94
Ships	35.38	40.99	42.75	34.87	34.87	34.87
Utility Boilers	41.84	39.18	41.75	12.41	12.41	12.41
Industrial Boilers	20.39	49.47	52.87	15.17	15.17	15.17
Miscellaneous	97.16	123.32	135.08	83.41	56.55	20.50
TOTAL	1039.78	904.72	1031.92	434.87	311.74	209.59

Figure 4-1.7 shows projected annual average NO₂ concentrations for three years and for three control scenarios in 2010 at five Basin monitoring locations. Results presented in this figure show that compliance could be expected by 2000 based on current control requirements but that two stations would again be out of compliance by 2010. Model results indicate that the SCAB could easily be brought into compliance with the Federal standard in 2010 if Tier I control measures are implemented. Even the highest concentration of 0.024 ppm, which is predicted to occur at Burbank, would be less than 50 percent of the standard. Implementation of Tier II and Tier III control measures would further reduce NO₂ levels throughout the Basin. Results of NO₂ modeling are provided in more detail in Appendix V-A of the AQMP.

Figure 4-1.7
Projected Annual Average NO₂ Concentrations
for Five Stations



Visibility

Reduced visibility is perhaps the most noticeable effect of air pollution. In the SCAB, visibility impairment is defined in terms of periods when relative humidity is less than 70 percent. This essentially eliminates periods when impairment is caused primarily by natural phenomena such as rain and fog. Air pollution induced visibility reduction results from light scattering by particles and from light absorption by gases. Most light scattering is caused by particles less than 2.5 microns in aerodynamic diameter. Particles in the 0.5 micron region are most effective at scattering because they are close in size to the wavelength of visible light (about 0.4 to 0.7 microns). Sulfates and nitrates have been identified as the most important light scattering components in the SCAB. Nitrogen dioxide and elemental carbon are primarily associated with light absorption (Davidson, 1983). [Visibility In The South Coast Air Basin - 1983] Nitrogen dioxide is responsible for the characteristic reddish-brown hue of smog in the Basin. Thus, NO_x emissions are responsible for a portion of light scattering (as nitrates) as well as discoloration (as NO_2).

Visibility data from 1982 have been summarized by Davidson (1983) in terms of number of days with visibility less than 3 miles when relative humidity is less than 70 percent. These data are plotted on Figure 4-1.8 (Davidson, 1983). The incidence of air pollution induced visibility impairment is greatest in the San Gabriel Valley and least in the San Fernando Valley and in coastal areas. This pattern was found to be roughly similar to the distribution patterns of particulate matter, nitrate and ozone.

Figure 4-1.8
 Visibility - 1982
 Number of Air Pollution - Induced Low Visibility*



* Number of days with visibility less than 3 miles at relative humidity less than 70%.

* Visibility measured closest to this location, but not at the air monitoring station.

Table 4-1.6 shows emissions projections of NO_x, SO_x and PM₁₀ for 1985, 2000, and 2010 (baseline) and Tier I, Tier II, and Tier III control levels in 2010. Without further control requirements, 2010 NO_x emissions will change little as compared to 1985 levels. SO_x emissions are predicted to increase by about 17 percent during this period while PM₁₀ emissions are projected to increase by almost 50 percent. PM₁₀ increases are due primarily to increases in road dust caused by mobile sources.

Table 4-1.6
Estimated Emissions for Pollutants Affecting
Visibility in the Basin

Pollutant	Emissions (tons per day)					
	Baseline Emissions			2010 Emissions		
	1985	2000	2010	Tier I	Tier II	Tier III
NO _x	1040	905	1032	435	312	210
SO _x	121	133	141	67	48	33
PM ₁₀	1228	1682	1812	1353	865	860

With implementation of additional controls, significant reductions in these emissions will be realized in 2010 as compared to the baseline case. Tier I controls will result in NO_x and SO_x reductions in 2010 of better than 50 percent as compared to all three baseline years. PM₁₀ emissions would be greater than 1985 levels but significantly less than baseline 2010 levels with Tier I controls. Further reductions in NO_x, SO_x and PM₁₀ would occur with Tier II and Tier III controls. Changes in NO_x and SO_x emissions are expected to be more significant for visibility than changes in PM₁₀ emissions because of the precursor relationship of the former two to nitrates and sulfates. Also, reductions in NO_x emissions will reduce atmospheric

discoloration. Changes in PM₁₀ emissions are due primarily to road dust. These emissions may have no more of an effect on visibility than nitrates and sulfates because they are not generally in the size range that is effective at scattering light. Only about 11 percent of paved road dust is less than one micron according to the Air Resources Board (1988). [Method Used To Develop A Size-Segregated Particulate Matter Inventory (Draft) - January 1988]

AQMP CONTROL MEASURES

To achieve the District's air quality goals, control measures will be implemented in three successive stages. Tier I measures make use of all currently available control technologies. Tier II measures, which are expected to be fully implemented in 1998, represent a more sweeping application of new and cleaner technologies coupled with additional emissions standards and charges. Tier III control has been conceptually conceived as a strategy that focuses on significantly cleaner-burning energy sources and solvent and coating reformulation.

In the following, air quality impacts and possible mitigations of the proposed measures for Tier I and Tier II control policies are discussed separately for each of the major emission source categories addressed by the policies. A general discussion of air quality implications and mitigation measures is given for the Tier III control policy.

TIER I CONTROL MEASURES

Surface Coating and Solvents

SETTING: The 21 control measures in the proposed AQMP Revision are designed to reduce ROG emissions from solvent use and surface coating applications. These measures, when fully implemented, would reduce ROG emissions by 151 tons/day.

IMPACT: Major reductions of ROG emissions are expected in three categories: wood furniture and wood products coating, coating and solvent use in automobile refinishing, and domestic products used in both the private and the public sectors.

Tier I control measures for wood furniture and wood products coating will reduce ROG emissions by 24.4 tons/day in year 2000, and 25.5 tons/day in year 2010. A major fraction of the reduced reactive hydrocarbon emissions will be toluene, with relatively minor portions of alkanes. As these are important photo-oxidant precursors, the control measures are critical to the District's plan to achieve compliance in ambient ozone concentrations.

The control measures for automobile refinishing are expected to reduce ROG emissions by 24.1 tons/day in year 2000 and 28.3 tons/day in year 2010. However, the ozone curbing power is not expected to be as high as those for the wood products coating category because a significant fraction of the reduced ROG emissions in this category occur from more slowly reacting compounds. For example, evaporative losses from primer application contain mainly acetone and benzene which, combined, account for more than 90% of the emitted ROG. Still, the control measures for solvent-based painting and solvent use in automobile refinishing are important elements of the District's ozone curbing plan.

Much of the ROG reduction in the domestic products category is effective in suppressing ozone. The reduction in the use of pesticides is especially beneficial in reducing reactive hydrocarbons that are also toxic (e.g., xylene). The control of domestic aerosol sprays may not be entirely effective, as some of the reactive hydrocarbons may be alkanes of low reactivities. The overall ROG reduction in this category is significant, constituting over 25% of the total projected reduction.

MITIGATION: Control measures that call for substitution of reactive solvents by exempt solvents may create unnecessary health hazards if the exempt solvents happen to be toxic but not addressed in the Tanner process. In such cases add-on control devices, such as carbon adsorption, could be used to effectively reduce the toxic emissions. Carbon adsorption techniques may also be preferred in cases where there are serious concerns about auxiliary fuel consumption, NO_x emissions, or residual wastes from add-on incinerators. Hazardous waste impacts from carbon adsorption units could be mitigated in part by recycling.

Oil Processing and Petroleum Distribution

SETTING: The control measures have been designed primarily to reduce fugitive emissions from valves, pumps, and distribution points, as well as emissions from refinery heaters and fluid catalytic cracking (FCC) units.

Non-refinery operations to be controlled include OCS operations, pleasure boat fueling operations, and gasoline transfer operations.

IMPACT: Although the anticipated reductions in ROG (20 tons/day), NO_x (26 tons/day) and PM (3 tons/day) are not high when compared to total emissions, they are important because some of the ROG emissions are very photochemically reactive. The reduction of toxic ROGs such as benzene and aromatic hydrocarbons from refinery emissions should be beneficial especially for populated areas close to refineries or major petroleum distribution points.

ROG emissions from refining facilities range from reactive aldehydes and alkanes to highly reactive olefins. Fugitive emissions from valves, pumps, storage and transfer facilities are major contributors to olefins and aromatics. A reduction of about 15 tons/day can be attributed to this category. The potential for photochemical formation of ozone will decrease significantly from these measures.

Hydrogen sulfide and mercaptans are toxic and strongly odorous chemicals that may escape from refinery flares due to incomplete combustion. Even at concentrations well below those considered toxic, their odor can still be detectable and become a source of public nuisance. Control measure B-12, proposed in the AQMP Revision, should help in this regard.

Improved controls of emissions from petroleum refinery FCC units will reduce SO_x and PM by about 16 tons/day and 1 ton/day respectively. These reductions are expected to help decrease potential acid deposition in the Basin.

MITIGATION: FCC control measures may increase the need for solid waste disposal because of collected particulate matter. This can be taken into consideration in the refinery waste management plan. Carefully controlled ammonia use may be required to minimize ammonia slippage in SCR or SNCR application for steam generators.

Food Processing

SETTING: The control measures focus on reducing ROG emissions from commercial charbroiling and from fermentation processes used by bakeries. A significant amount of PM₁₀ from commercial charbroiling will also be reduced.

IMPACT: The expected reduction of 1.8 tons/day of ROG from bakery fermentation processes is composed mostly of ethanol which is not photochemically reactive. The benefits are therefore not in ozone reduction but in reducing the toxicity of these commercial process. Ethanol is also flammable. Its reduction should lower the probability of fire hazards.

The reduction of 2.3 to 2.5 tons/day of ROG from commercial charbroiling will result in some benefits of ozone reduction. ROG emissions from charbroiling are both photochemically reactive and carcinogenic. Although most of the emitted hydrocarbons are alkanes of low to moderate reactivity, there are also highly reactive aromatic hydrocarbons emitted in charbroiling. The reduction of 9 to 10 tons/day of particulate matter, resulting from the control measures for commercial charbroiling, is significant because these emissions are typically less than 10 microns in size.

Significant side benefits are expected from these control measures. They include: ethanol recovery, reduced fire hazards, reduced NO_x, SO_x, and CO emissions, as well as energy savings.

MITIGATION: NO_x emissions due to operation of afterburners may be reduced by using catalytic type afterburners.

Woodworking and Abrasive Blasting

SETTING: Control measures call for the use of control equipment such as baghouses, and tighter requirements on abrasive blasting materials.

IMPACT: For woodworking and confined blasting, installation of baghouses will reduce about 95% of all particulate matter emitted, resulting in an estimated particulate matter reduction of over 35 tons/day for these sources. Over 50% of the reduction will be PM₁₀ (Gray, 1986). Tighter requirements on abrasive blasting materials will also help to reduce PM₁₀ emissions. Thus, the overall control for these sources should be significant in reducing PM₁₀ emissions in the District.

MITIGATION: No adverse effects are expected from these control measures.

Heaters, Boilers, and Steam Generators

SETTING: Separate control measures are recommended for small units (less than 5 MMBTU/Hr) and larger units used in industrial, institutional, and commercial applications. For small units, the principal method of control is the use of more efficient radiant burners. For larger units, combustion modification and flue gas treatment methods are used. Alternative fuels, such as methanol, for stationary sources, are still being actively pursued as topics of research. All these measures are aimed at reducing NO_x emissions.

IMPACT: Implementation of the proposed measures will bring about a 70% reduction of NO_x emissions in this source category. The leading contributor to the reduction is control of emissions from electrical power generating boilers, amounting to 27.4 tons/day for year 2000 and 29.2 tons/day for year 2010. Emission reductions of 8-9 tons/day for sources in the commercial and public sectors, and approximately 2.5 tons/day for small sources are also anticipated.

The very significant reduction in NO_x should help control ozone and PM₁₀ because NO_x is a precursor of ozone and particulate nitrate.

MITIGATION: There may be ammonia (NH₃) slippage when selective catalytic reduction (SCR) is used. The rate of NO₂ injection should be sought to maintain high NO_x reduction while minimizing NH₃ slippage.

Solid Waste, Sewage Treatment and Recycling

SETTING: Control measures include out-of-Basin transport of biodegradable solid waste, more stringent limits for industrial effluent discharge, add-on controls for sewage treatment plants, and increased recycling.

IMPACT: Out-of-Basin transport of biodegradable solid waste will eliminate about 4 tons/day of toxic ROG emissions. Relatively minor reductions of criteria pollutants will also result from this measure. The new control measures for publicly owned treatment works will reduce toxic ROG

emissions by about 1 ton per year. The relatively minor reductions of ROG emissions resulting from these control measures are not expected to have significant effects on ambient ozone concentrations. Increased recycling will reduce NO_x emissions 1.02 tons per day.

MITIGATION: No mitigation measures are necessary.

Agricultural Processes

SETTING: Significant reduction in ROG emissions will result from control measures for pesticide application and livestock waste. Control measures for the latter are also very important in reducing the District's ammonia emissions.

IMPACT: The reactive components of agricultural pesticides include moderately reactive alkanes and highly reactive aromatics (xylene and toluene). These emission reductions will have direct, beneficial effects in controlling ozone. The non-reactive but toxic components (e.g., benzene and methylene bromide) are addressed separately in Section 4-17 on toxic air impacts.

The ROG emissions from livestock waste are of low photochemical reactivities. They contain mainly methane and ethane. The small amounts of ethylamine and trimethylamine are toxic and carry strong odors. A very significant amount of ammonia reduction, 23 tons/day, will result from the control measures. Like the amines, ammonia is an odorous irritant, the control of which would benefit the local inhabitants. From the point of view of longer range impact, ammonia can contribute to the formation of PM₁₀ in the forms of particulate sulfate and nitrate. Therefore, reduction in ammonia emissions may help in reducing PM₁₀ concentrations in the District.

Direct controls on PM emissions include watering compost piles, which will bring about a 40% reduction of PM emissions from that category, and various means of suppressing wind-blown dust from agricultural areas. The amount of PM and PM₁₀ reduced in the latter category, however, are not known at this point.

MITIGATION: There is some concern that reduction of ammonia emissions may increase acid deposition in Riverside and San Bernardino because of the

neutralizing effect ammonia has on the acidity of precipitation. But reduction in SO₂ and NO_x should compensate for such effects.

Road and Building Constructions

SETTING: New guidelines are designed to reduce dust emissions from construction sites and their access roads. These involve more frequent watering and chemical treatments and less unnecessary gradings.

IMPACT: It is estimated that, by following the new guidelines, particulate emissions from road and building construction sites will be reduced by about 50%. There may be some increase in ROG and CO emissions due to increased use of watering equipment.

MITIGATION: No mitigation measures required.

Motor Vehicles

SETTING: The control measures are based on the use of clean fuels and reductions in electrification of transit buses. These will help to reduce all pollutants including ROG, NO_x, PM, and SO₂. Use of radial tires on passenger cars will also cut down particulate matter emissions.

IMPACT: Electrification of transit buses would practically eliminate all pollutants emitted from these vehicles. Uncertainties exist in evaluating the impact of using clean fuels in new fleet vehicles because the extent of future use of alternatively fueled vehicles has not yet been adequately determined.

Proposed clean fuels include compressed natural gas (CNG) and methanol. The benefits of substituting conventional gasoline and diesel fuels with CNG are better known than those resulting from use of methanol. Virtually all CO emissions and well over 50% of NO_x and ROG would be eliminated by using CNG. Although the unburned fuel exhaust from a methanol vehicle has significantly lower photochemical reactivity than that of the conventional vehicle, the full impact of the increased formaldehyde emission is yet to be determined.

The use of radial tires on all light duty passenger vehicles will result in reduced PM emissions of 3.1 tons/day for year 2000 and 3.7 tons/day for

year 2010. The longer lifetime of radial tires will also reduce significantly the need for tire disposal in the District.

MITIGATION: Potential adverse impacts from the methanol fuel program are being investigated by the District. Preliminary studies indicate that formaldehyde emissions from such a program can be mitigated below the permissible exposure levels.

Transportation System and Land Use

SETTING: By disincentives for idling at drive-through facilities and limitations on vehicle registration, the District expects to achieve significant reductions in CO emissions and secondary reductions in ROG and NO_x emissions from light duty passenger vehicles.

IMPACT: The idea of minimizing passenger car idling at drive-through facilities, such as fast food places and banks, is to encourage drive-through designs that minimize the car transit times rather than replacing car idling by engine stops and restarts. No quantitative assessment is available regarding the amount of CO reduction that can be driven from these control measures, as it has not been determined whether they should be applied to new facilities or both new and existing ones.

Control measures for passenger car registration restrictions include incentives for clean-fuel vehicles and raising registration fees. Based on a 5% reduction of passenger car registration, it has been estimated that reductions of close to 70 tons/day of CO, 8 tons/day of NO_x and 6 tons/day of ROG emissions from passenger vehicle exhaust are moderately reactive alkanes, a fair amount (-12%) of highly reactive olefins are also emitted. The expected reduction in ozone formation from these control measures is therefore quite significant.

MITIGATION: No mitigation measures are necessary.

Off-Road Vehicles

SETTING: Included in this category are the various ship and marine vessel facilities, jet aircraft, pleasure boats, and railroad locomotives. The control measures for jet aircraft and pleasure boats rely upon adoptions of new engine emissions standards. The other control measures involve reduced use

of conventional fuels for ship berthing and marine vessels as well as add-on controls for tank vessels.

IMPACT: The new engine emissions standards for jet aircraft and pleasure boats, when enforced, will result in a reduction of about 50% across the board of all ROG, CO, and NO_x emissions from jet aircraft, and about 60% reductions in NO_x and CO, along with a gradually increasing amount (from 6% in 2000 to 60% in 2010) of ROG reduction for pleasure boats. The reductions of over 20 tons/day of NO_x and from 12 to 36 tons/day of ROG should contribute to ozone reduction as both jet aircraft and pleasure boat engine exhaust contains significant fractions of highly reactive olefins and aromatics. The reduction of 105 to 210 tons/day of CO is also significant.

MITIGATION: No mitigation measures are necessary.

TIER II CONTROL MEASURES

Transportation Sector

SETTING: Tier II transportation control measures aim at maintaining vehicle usage at the 1985 levels by promoting the use of public transportation and rideshare on the one hand and by transportation infrastructure improvements such as 105 Freeway, Metrorail, etc., on the other. These measures will also require more extensive use of clean fuels and electric power sources of motor vehicles.

IMPACT: Tier II control measures, when fully implemented, will increase the use of clean fuels and electric power sources for passenger vehicle fleets in the District to the 40% level as compared with the 15-30% level for Tier I. Under Tier II control policies, 70% of freight vehicles and all diesel buses will be powered by electricity or clean fuels; off-road vehicle use of clean fuels will also rise to the 50% level. The combined effects of reduced vehicle usage in the District and increased use of clean fuels are estimated to amount to reductions of 15 tons/day of ROG and 90 tons/day of NO_x. These reductions would contribute toward ozone compliance in the District. The corresponding reductions in CO, SO_x, and PM are estimated to be 443, 11, and 17 tons/day respectively.

There are many side benefits to be gained from reduced vehicle usage. They include: less dependency on imported fuels, less highway congestion and traffic accidents, and reduced vehicle parts and tire disposals.

MITIGATION: No mitigation measures are necessary.

Surface Coating and Solvent Use

SETTING: Through the use of higher transfer efficiency application methods and alternative coating techniques, Tier II control measures are designed to reduce ROG, emissions from surface coating and solvent use by 50% of what remains after Tier I reductions.

IMPACT: Tier II control measures for surface coating involve requirements for more efficient coating methods, e.g., automated or robotic spraying, and use of non-ROG emitting coating techniques such as powder and radiation-curable coatings. Control measures for solvent use require replacement of solvent methods by non-solvent methods and reformulation of consumer solvents with less reactive agents. The overall effect of these measures is about a 50% reduction of the remaining ROG emissions from this source category. It amounts to about 85 tons/day, and is certainly critical in reducing the ozone forming potential of the Districts air.

MITIGATION: Some exempt solvents that are of low photochemical reactivity may be potentially toxic. In which case water-bourne substitutes or non-solvent methods may be preferred.

Stationary Sources

SETTING: By imposing fees and emission charges, Tier II control measures are designed to reduce emissions from three major categories of stationary sources: petroleum refining, building construction, and major stationary sources with pollution technologies that can potentially be improved.

IMPACT: Export fees for petroleum products and emission fees for construction dust emissions aim at reducing ROG and particulate matter emissions respectively. Technology-forcing emission charges will help reduce emissions of all major pollutants. The estimated reductions of ROG (170 tons/day) and particulate matter (494 tons/day) resulting from these control measures are especially significant. The ROG reduction will have a very

significant impact on the District's ozone levels. The anticipated NO_x and CO, and SO_x reductions are 33, 23, and 7 tons/day respectively.

MITIGATION: No mitigation measures are required.

TIER III CONTROL STRATEGY

Future Energy Use in the District

SETTING: Tier III control policy is based on large scale use of electric power imported from out-of-Basin sources. Electrification of motor vehicles, commercial and industrial equipment will greatly reduce fossil fuel usage in the District. Other strategies include maximizing the use of in-Basin renewable energy sources.

IMPACT: Large scale use of electric power and clean, renewable energy, e.g., solar and wind energy, will result primarily in a drastic reduction in NO_x emissions. It is estimated that potential reduction of NO_x emissions in the District may range from 215 tons/day to 500 tons/day, depending on the extent of electrification.

Drastic reduction in fossil fuel use in the Basin does not necessarily mean drastic reduction of ozone in the area. Ozone concentrations are influenced by regional meteorology. Long-range transport of precursor pollutants can cause high ozone levels in the District. Therefore, detailed modeling with various source and meteorological scenarios is required to assess the air quality impacts. Based on UAM model predictions, peak ozone concentrations will be reduced by about 25% and per-capita exposure in the District will also be significantly reduced by Tier III as compared with Tier II measures.

MITIGATION: No mitigation measures are required.

SECTION 4-2

WATER IMPACTS

Water Supply

Water Quality

Control of Fugitive Emissions From Construction of Roads and Buildings

SETTING: Significant amounts of particulate matter are generated by building and demolition activities. Land clearing, blasting, ground excavation, cut and fill operations, grading, travel on the site all contribute to fugitive dust emissions. Wind and water erosion further exacerbate these emissions. This measure sets construction management guidelines to minimize dust generation, including restrictions on hauling and grading. Application of water to exposed soil is considered the highest efficiency control.

IMPACT: This measure will require the application of significant amounts of water to control dust at construction sites. Some sites will require repeated applications to form a dust-deterring crust, depending on the type of soil, the weather and wind conditions. Implementation of watering controls could strain the Basin's limited water supply, particularly in dry years and in hot desert areas with few domestic water resources that would require the most frequent waterings.

MITIGATION: Seasonal and temporal controls on construction can help minimize the amount of water needed to counteract fugitive emissions stirred up by wind action. Chemical soil and dust binders may be appropriate for use prior to construction to suppress particulate emissions. Conscientious construction management practices can also minimize water requirements by avoiding water waste and runoff, and determining the optimal schedule for water application to achieve dust-binding results.

Growth Management

SETTING: Growth management controls would seek jobs/housing balance at the subregional level. Local ordinances and plans would encourage a higher level of housing production in job-rich areas than would otherwise occur, while housing-rich areas would establish more job-generating land uses. The improved efficiency of the Basin's urban form would reduce the length and number of home-to-work trips, thereby reducing emissions due to peak-hour commuting. The Growth Management Alternative 4-A Modified would be used to implement this control measure. Under this growth

projection, total Basin population, housing and employment growth will be the same as that expected according to trend, but it would be slightly redistributed within the region to achieve jobs/housing balance.

IMPACT: Population, housing and employment growth in the Basin will increase the demand for water over present levels. The region's domestic water sources satisfy only a fraction of the Basin's future water demand for residential, commercial/industrial and agricultural uses, and imported water is limited to amounts negotiated with suppliers outside the Basin. The growth accommodated by the Plan will strain the available domestic and imported sources.

Redistribution of expected growth to achieve jobs/housing balance will not affect the total amount of water needed in the Basin.

MITIGATION: The shortfall in available water supplies can be partially offset by aggressive water conservation measures such as low-flow plumbing fixtures in all homes, low-water landscaping, and drip irrigation. Wastewater reclamation can also provide additional water supplies, especially for landscaping and industrial purposes.

WATER QUALITY

Control of Emissions from Open Sumps, Pits, and Wastewater Separators

SETTING: ROG emissions occur during refinery and oil field production operations as a result of oil wastes. Oily wastewater is treated in separators to salvage the valuable oil; uncovered separators can be a source of emissions. Further, oil-bearing sand and oily wastes are stored temporarily in excavated depressions called sumps or pits, which give off emissions. This control measure calls for replacement of sumps and pits with holding tanks as is commonplace outside of California, as well as solid covers for separators.

IMPACT: This control measure benefits water quality in the Basin by removing sources of soil and groundwater contamination. Closure of sumps and pits will remove sources of leaks into the underground water supply.

MITIGATION: No mitigation is required.

Control of Emissions From Pleasure Boat Fueling Operations

SETTING: Pleasure boats use an estimated 20 million gallons of gasoline each year. While refueling stations control emissions when gasoline is transferred into their tanks, no controls collect the gasoline vapors displaced from the gas tank when a pleasure boat refuels. This measure would require that a vacuum-assisted recovery system and a rubber universal nozzle boot be used for refueling operations.

IMPACT: The vacuum-assisted recovery system and nozzle boot required by this control measure would provide water quality benefits by preventing gasoline spills into marine waters that would otherwise contaminate the water around marine filling stations.

MITIGATION: No mitigation is required.

Control of Emissions from OCS Exploration, Development and Production

SETTING: The federal Minerals Management Service estimates that outer continental shelf exploration for oil will result in approximately 200 exploration wells and 475 production wells off Southern California in the next 35 years. Some of these wells will be located within an area affecting the air quality of the Basin. This measure controls emissions of all pollutants generated during oil exploration as well as during development and production. These include diesel engine modifications, use of alternative fuels, inspection and maintenance programs and platform electrification.

IMPACT: The use of diesel engines and fuels to drill, pump, and power boats and barges during exploration and production activities would result in increased liquid and solid wastes. The volume of increase has not been determined. The presence of increased liquid and solid wastes could lead to contamination of ocean waters. The control measure would minimize wastes and risks by requiring use of alternative fuels and technologies, including platform electrification.

MITIGATION: Exploration and production platform operators can control the quality and volume of the wastewater they discharge through on-site pretreatment or dilution, and strict housekeeping practices to avoid spills of untreated wastewater.

Further Emission Reductions From Valves, Pumps, and Compressors Used In Oil and Gas Production Fields, Refineries and Chemical Plants

SETTING: Many types of valves are used by the petroleum, petrochemical, and chemical industries to regulate or control the flow of organic liquids and gases. Leaks in this equipment can lead to ROG emissions. This measure requires the use of leakless equipment, penalties for leaks, greater self-enforcement against leaks by operators, and the use of methane as the calibration gas for determining leaks.

IMPACT: This control measure will have beneficial side effects on water quality. A decrease in gas, oil and chemical leaks will reduce the potential for groundwater contamination caused by these substances when they spill on the ground and are washed into the soil.

MITIGATION: No mitigation is necessary.

Further Emission Reductions From Rubber Products Manufacturing

SETTING: Rubber products manufacturing typically involves a mixing stage, when rubber is combined with chemical additives such as vulcanizing agents, softeners, fillers, and antioxidants. This is sometimes followed by a curing stage. Manufacturing processes can be either cold or hot. The use of electrostatic precipitators and carbon adsorbers are recommended to control ROG and PM emissions that occur during manufacturing.

IMPACT: Implementation of this measure could generate liquid hazardous wastes as a result of cleaning and regeneration of carbon adsorbers. The amount of hazardous effluent has not been determined.

MITIGATION: On-site treatment of liquid wastes left over from cleaning the carbon adsorbers can reduce the amount and toxicity of hazardous liquid waste and reduce the possibility of water contamination.

Uniform Commercial Quality Standard On All Gaseous Fuels

SETTING: Petroleum refining and solid waste decomposition both generate fuel gases that contain relatively high amounts of sulfur. These "sour" gases would be "sweetened" using a variety of methods. Refineries may opt to use amine treatment to remove hydrogen sulfides, and the Merox process to eliminate mercaptans. Sewage treatment plants and refineries may employ the Stretford process or caustic scrubbing to remove hydrogen sulfide. Further, odor control methods for sewage plants include ferrous and ferric chloride injection to keep sulfur related odors at a minimum.

IMPACT: All of the processes described above involve the use of water-based solutions carrying active agents that remove the sulfur from fuel gases. The effluent remaining after these processes may contain constituents harmful to water quality if spilled on the ground or discharged directly to the sewer.

MITIGATION: Pretreatment or recycling water used in these "sweetening" processes can reduce the volume and toxicity of wastewater, and thereby reduce the risk of water contamination.

Lower Limits on Sulfur Content of Stationary Liquid Fuels

SETTING: This control measure is directed at reducing SO_x emissions from stationary sources by making available low-sulfur liquid fuels. New, more stringent standards for sulfur content of fuels would be put in place. Refiners would then select an appropriate technology for reducing the sulfur content, including hydrodesulfurization, fuel blending, and use of lower sulfur crudes.

IMPACT: Desulfurization would generate liquid wastes containing the spent catalytic agents and sulfur removed from the fuel. These liquid wastes will require proper disposal, into the sewer or other pretreatment process prior to discharge in the sewer. Liquid wastes also present the risk of groundwater contamination if they spill or seep into the soil.

MITIGATION: Refiners can be encouraged to use a desulfurization process that generates the minimum feasible liquid waste. Wastewaters resulting from desulfurization can be treated on-site to reduce the possibility of contamination, and then recycled or discharged to the sewers.

Control of Emissions From Soil Contamination

SETTING: This measure sets procedures for cleaning up or disposing of soil contaminated by volatile organic compounds (VOC) as a result of accident, spill or leaking underground storage tanks. Control measures include on-site collection of VOC with air injection and vacuum wells; removal of contaminated soil from the site to incinerators or landfills in sealed containers; on-site treatment with a portable incinerator or carbon adsorber; and biological degradation processes.

IMPACT: This measure provides water quality benefits by facilitating removal or cleaning of contaminated soils that could lead to groundwater degradation if water is allowed to carry the contaminants deeper into the ground. This measure also reinforces current State Water Resources Control Board programs implementing underground tank monitoring and replacement legislation designed to prevent VOC contamination of groundwater.

MITIGATION: No mitigation is needed for the positive impacts identified above.

Phase-Out Stationary Source Fuel Oil and Solid Fossil Fuel Use

SETTING: Natural gas, methanol, and other alternative fuels would be substituted for distillate and residual fuel oils and solid fossil fuels such as coal used by stationary sources.

IMPACT: Methanol is both toxic and corrosive. Increased handling, transportation and storage of methanol could pose increased risks of groundwater contamination. Underground storage in tanks poses a particular risk of leaks due to corrosion.

MITIGATION: Operators can be required to use storage tanks and pipes constructed only with non-corrosive materials. Regular monitoring for tank leaks will guard against soil contamination that could lead to deeper groundwater pollution.

Control of Fugitive Emissions From Publicly Owned Treatment Works

SETTING: Sewage treatment plants receive residential and industrial wastewater that contains volatile organic compounds (VOC) which can vaporize and be emitted into the air during treatment. Emissions from sewage treatment plants depend on each plant's design (the amount of agitation or aeration the wastewater undergoes), and the types of wastewater it receives. This measure calls for more stringent limits on industrial effluent put into the sewer, and add-on controls such as carbon canisters and scrubbers at the plant itself to remove the emissions before they diffuse in the air.

IMPACT: Placing more stringent standards upon industrial wastewater discharged into the sewer system would have a beneficial effect on water quality. Higher quality wastewater would reduce the potential for contaminated effluent to interfere with biological processes used in wastewater treatment, and will reduce the amount of sludge and other liquid waste byproducts of treatment that require landfill disposal. Operators can comply with higher effluent standards by altering production processes or pretreating wastewater to remove potentially harmful constituents.

MITIGATION: No mitigation is required.

Control of Emissions From Pesticide Application

SETTING: Pesticides commonly include insecticides, fungicides, and herbicides that come in a variety of forms such as powders, dusts, granules, aerosols, concentrates, and oil solutions. ROG emissions from pesticides derive mainly from the use of petroleum products and solvents in the formulations. This control measure addresses agricultural, industrial and commercial application of pesticides. Operators would be called upon to switch to less-polluting formulations, or those with lower vapor pressure solvents that are less likely to evaporate. Increasing particle size or the

viscosity of the formula would also help to reduce spray drift. Application techniques can also reduce emissions. These efforts include using a spray with larger droplets, lowering spraying height closer to the ground, and incorporating the pesticide into the soil. Pesticide use could also be restricted to times with low ozone concentrations or good weather characteristics such as low wind.

IMPACT: Modifications in the formulation of pesticides could be beneficial for water quality. To the extent that less toxic compounds are substituted for petroleum and solvents, the risk of soil contamination leading to groundwater or surface water pollution would be decreased. Modifications in the application of pesticides could be adverse to water quality to the extent that toxic pesticide constituents are brought closer to or into the soil, which could lead to contamination of groundwater or surface run off.

MITIGATION: Operators can take caution to match reformulated pesticides with the best available application methods to achieve minimum emissions.

Control of Emissions From Livestock Waste

SETTING: Approximately 500,000 dairy animals produce emission-generating wastes in the region. This measure calls for alternative uses of livestock waste, alternative disposal methods, addition of water to compost piles, and better housekeeping practices.

IMPACT: Implementation of this measure would generally benefit water quality in areas where dairy and livestock activities are located, as well as downstream areas. Better housekeeping methods such as more frequent disposal of manure and capture of liquid waste in aeration ponds can prevent contamination from sitting wastes from being washed into the soil, and eventually into the groundwater.

Disposing of liquid wastes by slurring them into the sewage treatment system would also prevent waste contaminated water from seeping into the soil, but would create added loads at sewage treatment plants. Watering manure compost piles would control fugitive dust emissions, but could lead to soil, groundwater, or surface water contamination if excessive amounts of water are applied.

MITIGATION: Any potentially negative side effects of watering compost piles can be reduced through careful housekeeping practices and periodic monitoring by operators and the Regional Water Quality Control Board.

Growth Management

SETTING: Growth management controls would seek jobs/housing balance at the subregional level. Local ordinances and plans would encourage a higher level of housing production in job-rich areas than would otherwise occur, while housing-rich areas would establish more job-generating land uses. The improved efficiency of the Basin's urban form would reduce the length and number of home-to-work trips, thereby reducing emissions due to peak-hour commuting. The Growth Management Alternative 4-A Modified would be used to implement this control measure. Under this growth projection, total Basin population, housing and employment growth will be the same as that expected according to trend, but it would be slightly redistributed within the region to achieve jobs/housing balance.

IMPACT: Redistribution of population, housing, and employment under GMA-4 Modified would affect the distribution of demand for wastewater treatment in the region. Urbanizing areas would experience increased demand for treatment facilities than might otherwise occur. Publicly owned treatment works would need to adjust their capacities to reflect this redistribution of demand, and new or expanded plant capacity would be required in some areas.

MITIGATION: Aggressive water conservation (e.g. low-flow plumbing) can reduce the amount of wastewater entering the sewage treatment system, thus optimizing the use of available plant capacity and minimizing the need for new treatment works. At industrial sites, on-site treatment of waste water can convert some effluent for reuse. Package plants that are not part of publicly owned treatment works may provide additional wastewater treatment capacity at the developer/owner's cost for primary treatment. However, in order to discharge treated water into navigable waterways, treatment facilities must obtain National Pollutant Discharge Elimination System (NPDES) permits and comply with the conditions of the permits, including annual treatment capacity..

Tier I Surface Coating and Solvent Use Control Measures

SETTING: All 21 of these measures seek ROG emission reductions from a wide variety of commercial and industrial products which use solvents in their manufacture. Surface coatings with high solvent content used on products ranging from wood furniture to paper, fabric and film account for 10 of the control measures. The remainder focus on controlling solvents used during manufacturing processes for cleaning and degreasing, or as propellants or solubilities agents for consumer products such as underarm products. Three control approaches characterize these measures: substitutes for solvents are required, particularly for surface coatings; application methods favor those that use less solvent; and add-on controls to capture and neutralize emissions are required.

IMPACT: Implementation of these measures will decrease the amount of solvents used in the Basin. Water and other chemical agents will be used in their place. This will result in reduced volumes of contaminated wastewater requiring pretreatment before discharge to the sewer system. Water contamination due to solvent leaks and spills will be reduced.

Add-on controls typically involve carbon adsorption of emissions during the manufacturing process. Liquid wastes will result from scrubbing, as well as from steam cleaning the carbon units for reuse.

MITIGATION: Use of disposable carbon units could decrease the amount of wastewater generated during steam cleaning.

SECTION 4-3

PLANT LIFE

Impacts on Plant Life

PLANT LIFE

SETTING: Construction of higher density residential and commercial buildings, provision of adequate public services (e.g., water and to support new urban patterns, and construction of additional transportation infrastructure may have an effect on plant life as land use patterns change.

Several measures also encourage changes in agricultural practices in order to decrease particulate and reactive organic gas emissions.

IMPACT: As additional land is developed, both agricultural land and open spaces may be reduced. This may in turn alter the diversity and number of plant species growing in the area as well as introduce new plant species that may compete with existing plant species.

Measures to control fugitive dust emissions may involve alterations in agricultural practices which affect plant life or result in reductions in agricultural crop acreage. Also, efforts to reduce air emissions from pesticides may influence the type, quantity, or quality of plant life as the amount of pesticides, their application, and their composition are altered.

MITIGATION: Local jurisdictions should consider sensitive environments by preserving these areas or by revegetating excavation surface areas with local native plants when approving or amending their General and Specific Plans. Agricultural land should also be considered for preservation through regulatory controls, incentive measures, and direct local jurisdiction expenditures. An alternative mitigation would be to relocate some agricultural uses to another area which is not available for intensive urban land uses.

SECTION 4-4

ANIMAL LIFE

Impacts on Animal Life

ANIMAL LIFE

SETTING: As existing land uses are altered to provide housing, services, and transportation infrastructure to support the projected population growth, animal habitats may be disturbed or altered.

IMPACT: Measures to control fugitive dust emissions may involve alterations in agricultural practices which affect plant life or result in reductions in agricultural crop acreage or types of crops grown. In turn, these changes may affect animal habitats by increasing the amount of paved surface area, affecting the food supply to the animals, and bringing an urban environment closer.

MITIGATION: Local jurisdictions should consider the impacts on sensitive animal species when approving new construction and development. Every attempt should be made to preserve significant animal habitats.

SECTION 4-5

NOISE

Noise Impacts

NOISE

SETTING: Increased residential density and activity, construction of additional transportation infrastructure, and increased urban vehicle traffic in currently less urbanized areas are expected to result from implementation of the AQMP. As Tier III measures are implemented, additional electrical energy will be needed to power electrified transportation sources and, to a limited extent, stationary sources.

IMPACT: Noise levels may increase temporarily due to housing, business, transit line, and freeway construction. Permanent noise increases may result from increased urban densities, more urbanized traffic patterns, increased bus and rail transit lines, and increased freeway traffic. Furthermore, consolidation of freight shipping activities to facilitate use of rail transport may also increase the noise levels around these facilities, as well as along rail corridors.

To the extent that wind power is used to supply additional electrical generating capacity, noise from wind turbines located at these facilities would be expected to increase as a greater number of wind turbines are constructed and used.

MITIGATION: Temporary noise levels associated with construction of new developments can be minimized by 1) controlling hours of operation; 2) control and design of traffic flows of trucks and other construction related vehicles in route to or from construction sites; and 3) where construction activity on parcels of land are in close proximity to existing residents, temporary screening measures should be considered.

Permanent or ambient noise consists of the all encompassing noise within a given environment. Some examples include noise generated from traffic flows, industrial activities and residential and non residential uses in the community. For the most part, the impact of noise intruders can be mitigated through the use of site design by insulation of houses and buildings along freeways, and busy streets; screening highways with trees or walls; and, land use planning for property bordering on heavily traveled roads, uses of easements and adequate setbacks. These measures coupled with active enforcement on the part of State agencies, along with city and community

ordinances controlling community noise, would provide the reduction of unnecessary noise.

SECTION 4-6

LIGHT AND GLARE

Light and Glare Impacts

LIGHT AND GLARE

SETTING: As urbanization increases, additional and more dense communities and employment centers will be built. Additional lighting such as night lights will be required to accommodate the newly developed areas.

IMPACT: Light and glare may increase as a result of rising residential and employment densities. To the extent that additional electrical generating capacity is required, and is supplied by solar power, light and glare from solar dishes and reflectors at power generating stations would be expected to increase as reliance on this alternative energy source increases.

MITIGATION: Considerations should be made in the urban development design by minimizing lighting in reflective structures and surfaces as well as not reducing access to sunlight by shade and shadow from buildings. As in the case of wind turbines, consideration can also be given to siting communities and developments around these power generating sources by providing buffer zones and landscaping for increased shade.

SECTION 4-7

LAND USE

Land Use Impacts

TIER ONE

Alternative Work Schedules and Locations

SETTING: Alternative work schedules and telecommuting by either working at home or in satellite work centers located near residential areas have been proposed in the Plan.

IMPACTS: In the short-term, telecommuting by a significant portion of the workforce could result in a proliferation of small-scale local work centers in areas not previously planned for office or commercial development. This would require changes in local land use plans and zoning ordinances to accommodate and guide the placement of work centers.

Because the socio-economic distribution of telecommuting opportunities may be uneven, the need for work centers would not necessarily be distributed evenly in the Basin. Moderate and upper income residential areas may feel the greatest pressure to designate appropriate land uses and zoning, improving jobs/housing balance in these areas.

In the long-run, widespread telecommuting would reinforce the general trend toward low-density suburbanization that characterizes the Basin. Major job centers would be less pronounced as trips and employment opportunities spread more evenly across the Basin.

The deemphasis of centers that would occur as a result of widespread telecommuting can be considered beneficial due to the redistribution of trips away from congested employment centers. However, this success may undermine some air pollution control strategies that rely on transit development, which depends on creating a critical mass of trips to a network of centers.

MITIGATION: Local governments can address the need for local work centers through general plan amendments or zoning changes intended to identify appropriate sites for these facilities. Several adjacent cities could join together to designate sites to minimize the need for duplicative plan and zone changes, and to insure efficient siting of facilities. Communities with

few "information" workers could establish appropriate land uses and zoning to attract developments that would, in turn, attract a different mix of household incomes and employment opportunities to the jurisdiction.

Mode Shift Strategies

SETTING: Several measures have been proposed that would encourage people to shift from single-occupant vehicles to other modes of transportation. These measures include: Employer Rideshare and Transit Incentives, Parking Management, Merchant Transportation Incentives, Auto Use Restrictions, HOV Facilities, and Transit Improvements.

IMPACTS: All of the above mode shift measures could cause a change in local land uses to adjust to new parking demands, space for pedestrian facilities and rerouting of traffic, and additional land designated for circulation purposes.

Employer Rideshare and Transit Incentives, Parking Management, and Merchant Transportation Incentives could all involve restricting the availability of parking. Local governments may reinforce this measure by lowering the amount of parking required for commercial retail and office developments. This could free land that could otherwise be reserved for parking for additional development, which could result in higher employment and/or residential densities.

Increased development in conjunction with reduced parking could have three types of secondary impacts. One possibility is that local congestion could be exacerbated in the short-term if automobiles are not deterred by parking scarcity and higher prices. This could become a permanent condition if reasonable transit alternatives are not developed concurrent with new parking regulations. A second possibility is that parking scarcity could motivate a transition to transit, with the added development creating the critical mass of employees and residents required to sustain transit service. This scenario could require land use adjustments in other jurisdictions in order to designate and develop park and ride lots and transit facilities to serve commuters.

A third outcome could simply shift employers, jobs, and residents to other less restrictive areas over time. Each of these possible long-term scenarios could result in local land use adjustments to meet changing demand for

commercial and industrial space, and corresponding changes in residential land use pressures.

Auto Use Restrictions could create pedestrian zones within centers, and require trip reductions from special event centers. This measure could necessitate new local land use and circulation plans aimed at pedestrian needs in affected centers. Additional land may need to be committed for transit access in order to provide adequate access to and through pedestrian zones. The measure could also require availability of park and ride lots in areas feeding special event centers. On the other hand, this measure could eliminate the need for land for new parking facilities, and could free land for other uses within affected centers.

Establishment of HOV lanes and transit improvements could require commitment of additional land to accommodate transit turn-out, reserved lanes and other infrastructure. In addition, designation of new transit routes could result in land use adjustments along the new corridors that are created. The effects of mode shift strategies are given in further detail in the Regional Mobility Plan and Growth Management Draft Environmental Impact Reports (SCAG, 1988).

MITIGATION: Local general plans can be revised and amended to address the land use requirements and impacts of new transit routes, parking limitations, and designated HOV lanes. Caltrans can update and expand its plans for park and ride lot development to address greater demand in areas feeding major commercial/industrial centers that could be served by increased transit and impacted most heavily by parking restrictions.

Growth Management

SETTING: The Growth Management measure proposes to balance jobs and housing in the Basin through local policies and planning activities in order to reduce traffic congestion, and therefore also reduce vehicle emissions. While the total Basin population would remain the same as that anticipated under strictly trend conditions, local policies would intervene in the trend distribution of jobs and housing to create greater balance within subregions. Lower emissions due to shorter commutes and more efficient travel patterns would result.

IMPACTS: The impacts of the growth management strategy are described in greater detail in the Environmental Impact Report prepared for SCAG's Growth Management Plan (SCAG, 1988). The Baseline Population Projection would result in changes to the mix, location and density of land uses within the Basin. Growth according to trend will require commitment of additional undeveloped acreage to urban uses to accommodate the 43% increase in population, 52% increase in housing, and 34% increase in employment. Most of this conversion to urban use will occur in northern Los Angeles County, San Bernardino and Riverside Counties where vacant developable land is most available. Present trends suggest that urbanization at the edges of the existing metropolis will replicate the typical suburban mix of uses with single family residential predominating, unless government or market forces intervene to create other density patterns.

Part of the growth forecast by the trend projection could be absorbed in the existing urban area through recycling and redevelopment of existing land uses to higher densities. This could alter the ratio of residential to commercial and industrial land uses in the long run.

Implementation of a Jobs/Housing Balance Growth Projection could intervene directly and indirectly in local land use decisions. Job-rich areas slated for housing growth in excess of trend could be affected by changes in local land use plans to provide either more acreage for residential uses, or greater residential densities. Housing-rich areas earmarked for employment growth could require land use adjustments to make more commercial/industrial land available, or to create higher employment densities.

The Jobs/Housing Balance Projection could alter the Basin's urban form over time. The Basin's characteristic low density distribution of both housing and jobs could become a more formal network of centers including employment concentrations in current urbanizing areas.

MITIGATION: Local land use plans will provide the most effective mechanism for anticipating, controlling, and limiting the land use impacts caused by shifting expected future job and housing growth from one area to another. General Plan amendments can be approved and implemented to insure that adequate land is available to accommodate either more homes or more jobs at a desirable density.

Freeway Capacity Enhancements

SETTING: The Freeway Capacity Enhancement measure proposes to cut auto and truck emissions by providing 875 new lane-miles of freeway to alleviate severely congested routes. Routes to be included in this total have been designated in Regional Mobility Strategy 3 developed by the Southern California Association of Governments.

IMPACTS: Freeway Capacity Enhancements will require alignments and right-of-way dedications for 875 lane-miles of freeway, based on Regional Mobility Strategy 3. Some of these lane-miles represent new corridors that were not assumed in the land use plans of communities they will pass through, such as South Pasadena (I-10) and cities stretching from Azusa to Fontana (Route 30). Significant land use adjustments will be required to acquire the new routes. Secondary land use adjustments adjacent to the routes could be needed to recreate rational surface street circulation and avoid fragmenting neighborhoods and commercial districts. Freeway capacity enhancements will also open some urbanizing areas to development, causing the commitment of developable land to urban uses.

In the long-term, Regional Mobility Strategy 3 could initiate moderate, localized changes in urban form as a result of the new access created. The impacts of freeway capacity enhancements are described in greater detail in the Environmental Impact Report prepared for the Regional Mobility Plan (SCAG, 1988).

MITIGATION: Local land use plans that encourage balanced housing and commercial development can help avoid creation of job-poor bedroom communities in areas opened to development by the new routes. Likewise, development plans for job-rich urban areas receiving improved access can include sufficient housing to avoid exhausting all of the increased capacity with commuter trips.

TIER TWO

High Speed Rail

SETTING: This measure calls for construction and operation of a high speed rail line connecting the Basin San Francisco. High speed rail service could satisfy significant demand for air connections to San Francisco, resulting in lower aircraft emissions and lower emissions from ground traffic attracted by airports.

IMPACTS: Establishment of high speed rail in the Basin could require dedication to a right of way of land now used for other purposes. Due to the 250 to 300 mile per hour speeds possible on the tracks, land use compatibility will be a major issue. Acquisition of a wider than usual right of way may be necessary to provide an adequate land buffer between the tracks and adjacent land uses. Depending on the magnitude of other environmental impacts such as noise and vibration residential land uses adjacent to the alignment may eventually be converted to other more commercial or industrial uses less sensitive to these impacts.

In addition, local land uses will be affected in areas around designated high speed rail stations. The demand for commercial, industrial and visitor serving uses are likely to intensify near these facilities.

MITIGATION: Negative local land use impacts can be mitigated by routing high speed rail away from residential areas. Advance local land use and zoning adjustments can also prepare communities for the arrival of a high speed rail corridor with minimum disruption to local uses. Likewise, careful corridor planning in concert with local land use authorities can result in stations sited in a manner that will minimize land use disruptions and allow for an orderly transition to compatible commercial and industrial uses in surrounding areas without widespread displacement of homes or businesses.

TIER THREE

Electrification

SETTING: In the process of electrifying the industrial and transportation sectors in the Basin, energy providers are expected to develop substantial additional electricity generation capacity outside the region. At present, electrical energy is transmitted into the Basin to supplement locally generated supplies via three corridors: a northerly corridor entering the region through the Grapevine along Interstate 5; and two corridors entering the eastern end of the Basin, one through Cajon Pass on Interstate 15, and the other entering through Daggett in Riverside County.

IMPACT: The magnitude of additional energy to be transmitted into the Basin could likely exceed the physical capacity of existing corridors to handle the necessary power lines. As a result, new corridors may need to be established to provide adequate and safe transmission lines. The orientation, length and width of new corridors could depend on the number and location of outside electricity sources established for the Basin. As an alternative, existing corridors could be expanded through acquisition of new land if available and not already committed to other urban uses.

New or expanded corridor lines could influence the continued viability of some existing land uses: power lines may be incompatible with sensitive land uses such as schools or recreation. New or expanded corridors could also alter large scale land use patterns in some subregions over time.

MITIGATION: Maximum efficient use of existing corridors will be the most effective mitigation measure. Expansion of existing corridors where possible will avoid introducing energy transmission impacts to new areas.

Advance coordination of local land use planning efforts can minimize land use impacts by identifying and preserving land needed for future energy corridor expansion. Cooperation among counties, affected cities and energy companies will be needed. Local jurisdictions can avoid land use conflicts by incorporating new corridors and associated land buffers into their General Plans in advance of their development.

Improvements in transmissions lines and storage efficiency would also help mitigate the effects of increased electrification by enabling existing corridors to better handle additional energy demand.

SECTION 4-8

NATURAL RESOURCES

Land

Fossil Fuels

Natural Gas

Renewable Resources

INTRODUCTION

Implementation of the AQMP will commit significant environmental and natural resources irrevocably within the Basin to urban uses. The substantial scope of the project and the effort and financial resources that must be committed to implement the Plan make it unlikely that the changes brought about by the plan can be undone. Yet much of the plan's underlying philosophy is to improve air quality by using existing resources more efficiently, with significant emphasis on conservation tactics ; more efficient use of existing land and infrastructure; and increased substitution of renewable resources for non-renewable ones.

LAND

SETTING: Many of the control measures contained in the AQMP require the cooperation and support of local jurisdictions in order to be implemented. For the AQMP to be effective, local jurisdictions will need to reflect the changes in population distribution, land use, and housing/commercial location projected to occur in their General Plans. These plans provide both the long and short-term blueprints for each jurisdiction's development. Also, many of the transportation infrastructure measures will commit significant amounts of land to build roads, enhance existing road capacity, and construct rail transit corridors.

IMPACT: If local jurisdictions do not include the changes anticipated by the AQMP measures, current land resources will not be significantly altered from those uses currently planned. However, if these measures are not included in a local jurisdiction's General Plan and a commitment is not made to implement the various land use and growth management policies, the air quality benefits from these measures will not be realized.

Implementation of the many land use, growth management, and transportation measures included in the AQMP will change current land uses significantly. As more growth and accompanying residential and commercial development occur, significant pressure will exist to develop land currently

designated as agricultural or open space. More efficient use of existing developed land is expected to result in increased densities in existing urban areas. Increased intermingling of residential and commercial development is also expected to occur.

Construction of additional highway miles and other transportation improvements will decrease the amount of open space available and will alter land uses in adjacent areas. Entrance and exit ramps, along with feeder roadways, will influence urban design and development as communities located near the highway are established or increase in population.

MITIGATION: Local jurisdictions can help counteract the incentive to develop open spaces or agricultural land by making attempts to preserve these uses, as well as by establishing policies such as in-filling and mixed land uses which use existing developed land more efficiently.

Overall development policies and zoning decisions can be tailored to more effectively accomplish the goals established in the General Plan. In addition, increased awareness of the air quality impacts of land use decisions at both the local and regional level can help to coordinate land use decisions between jurisdictions.

PETROLEUM AND COAL

SETTING: Many of the control measures contained in the AQMP are intended to decrease or eliminate the use of fossil fuels because of the substantial adverse air quality impacts from the combustion products. The AQMP specifies the substitution of fossil fuels with electricity and clean fuels such as methanol.

IMPACT: Stringent controls which restrict the use of fossil fuels in the Basin will have significant positive impacts on air quality. The use of petroleum products such as gasoline, diesel fuel, and petroleum fuel oils is expected to decrease substantially as a result of implementation of the AQMP's control measures.

Significantly decreased demand for petroleum-derived fuels will allow petroleum resources to be used for other petroleum-based products, such as plastics or chemicals. However, decreased demand for petroleum products resulting from stringent controls on the use of fossil fuels will have significant

economic impacts on the petroleum industry. These impacts are described in greater detail in the section on economic impacts.

In addition, the use of coal resources is expected to increase significantly because coal is a likely fuel for the increased electricity generation which may be needed for the electrification strategy. Coal use may also increase if it is used as a feedstock for methanol production, as methanol consumption increases with the implementation of the AQMP's clean fuels measures. However, since methanol production from coal is much more expensive than from natural gas, this impact is expected to be slight. Increased combustion of coal outside the Basin may affect the air quality in areas where electrical energy is generated.

MITIGATION: Decreased combustion of fossil fuels results in a positive impact on the environment and preserves fossil fuel resources. No mitigation action is required.

The impacts resulting from coal used to generate electricity can be mitigated in part by use of BACT and offset requirements. Both the EPA and other states have guidelines and regulations to ensure that significant adverse impacts are mitigated.

In order to help conserve coal resources, electricity conservation programs and more efficient coal-to-methanol processing techniques should be pursued. Development of solar and wind energy for electricity generation are also alternatives to the use of coal.

NATURAL GAS

SETTING: Although natural gas is a cleaner fuel source than are petroleum-based fuel oils, gasoline, or diesel fuels, and has been substituted for these fuels in order to decrease emissions, the replacement of natural gas by electricity and clean fuels such as methanol provides additional air quality benefits. Measures contained in the AQMP would phase out the combustion of natural gas in industrial processes and substitute cleaner energy sources such as methanol and electrification. On the other hand, methanol is frequently produced using natural gas as a feedstock. In addition, selective catalytic reduction (SCR), a NO_x removal process specified in various AQMP measures, utilizes ammonia, which is produced from natural gas.

IMPACT: Decreased industrial demand for natural gas will make it available for other uses, including methanol and ammonia production. Also, it is unlikely that methanol will be manufactured in the Basin. (However, the Basin demand for natural gas to produce ammonia is expected to decline substantially with the anticipated closure of the Basin's only major ammonia production facility in Brea.) Increases in population will also increase the demand for natural gas. However appliance efficiency improvements and conservation efforts in the residential and commercial sectors are expected to offset this.

MITIGATION: More efficient residential and commercial appliances and processes will help mitigate some of the impact of increased demand for natural gas. Use of coal as an alternative feedstock for processes that use natural gas, such as methanol production, can also help mitigate the depletion of natural gas supplies.

RENEWABLE RESOURCES

Lumber

SETTING: Population growth and the need for additional housing will increase the demand for lumber.

IMPACT: Increased pressure to build additional housing will require that more trees be cut down to provide lumber. This would destroy forest ecosystems and decrease the amount of timber available for other uses such as production of paper products.

MITIGATION: Timber cutting practices can be altered to provide a sustained yield from forests, instead of engaging in clear-cutting and slow regeneration of forests. Such methods are likely to raise the price of lumber, making housing more expensive. However, increased lumber prices also serve as an incentive to use lumber more efficiently in construction. AQMP measures which increase housing density may reduce lumber usage in housing construction, as when, for example, townhouses (with common walls) are constructed instead of detached single-family dwellings. Use of other materials such as stucco and brick can also decrease the amount of lumber required in construction.

Paper

SETTING: Stringent add-on controls may decrease the cost-effectiveness of paper manufacturing in the Basin. Recycled paper is a primary feedstock of paper manufacturers in the Basin.

IMPACT: Decreased demand for recycled paper due to closure of recycling facilities from more stringent regulation will have an adverse impact on the amount of paper recycled. If less paper is recycled, more virgin timber will be used to produce paper products. Because more energy is used to produce paper from virgin materials than is used to produce similar products from recycled paper, additional energy, use and the associated environmental impacts, would result.

MITIGATION: Local and state governments could stimulate recycling efforts, by such methods as increasing refuse collection fees, and establishing local recycling centers. Out-of-Basin markets for recycled paper, including international markets, could also be located, in the event that Basin paper manufacturers were forced to close by enactment of more stringent emission standards.

RENEWABLE ENERGY RESOURCES

SETTING: The AQMP projects the addition of approximately 1000 MW of solar and wind-powered electricity generating capacity in the Basin as part of the Tier III electrification strategy. Solar water heating and solar space heating are additional AQMP measures.

IMPACT: Renewable energy sources such as solar and wind can reduce the consumption of both natural gas and electricity, producing an air quality benefit. Rooftop solar panels for water and space heating and rooftop photovoltaic panels for electricity production may produce glare impacts. Electric utility solar panels, for either photovoltaic or thermal processes, may also have glare impacts, as well as occupying significant land area.

MITIGATION: Renewable energy production is itself a mitigation measure for the environmental impacts of energy production from conventional sources. Daytime glare impacts of solar panels may be an unmitigable impact, since exposure of the panels to the sun is necessary and since their

surfaces must be smooth and planer, and hence highly reflective. For utility-size solar electric generating facilities, landscaping with tall trees may reduce glare impacts on the immediate vicinity somewhat. Land where solar electric generating facilities are sited may also support other, compatible uses, such as storage or agriculture.

SECTION 4-9

RISK OF UPSET

Introduction

Add-on Control Equipment

Vapor Recovery Systems

Selective Catalytic Reduction

Alternative Fuel Technologies

Reformulation of Solvents and Coatings

INTRODUCTION

Several of the control measures proposed in the Plan have the potential to enhance the risk of fires, explosions, spills, gaseous releases, or other health and environmental hazards. The likely areas from which one or a combination of these risks are presented includes operations, production, transportation, storage, treatment, handling or disposal of toxic or hazardous materials.

ADD-ON CONTROL EQUIPMENT

SETTING: Add-on equipment can be used to control emissions from various processes to capture or eliminate air pollutant emissions before they enter the atmosphere. Controls which are included in this category are carbon adsorption units, thermal incinerators, and catalytic incinerators.

IMPACTS: The impacts of add-on controls used to reduce emissions vary by the type of add-on control device utilized. Impacts can range from increased groundwater contamination to air pollution.

Use of carbon adsorption equipment concentrates hazardous organic compounds in the spent carbon, requiring recycling or disposal. This practice could present an environmental hazard if proper handling or disposal is not practiced. Thermal or catalytic incineration, an alternative to adsorber disposal or recycling, could cause criteria air contaminants to be produced as a result of the combustion process. In addition, incomplete combustion products released into the atmosphere could result in significant adverse environmental impacts.

MITIGATION: Impacts from add-on control devices can be mitigated by strict enforcement of design, operation and maintenance standards. Applicants or operators of these devices must comply with the requirements of various regulatory agencies, including District BACT requirements. Impacts from these sources can be reduced to insignificance through regular inspection, monitoring and good housekeeping.

VAPOR RECOVERY SYSTEMS

SETTING: Vapor recovery units are designed to handle vapors originating from filling operations as well as from breathing. The recovery vapors are compressed and charged to an adsorption unit for recovery of condensable hydrocarbons. Noncondensable vapors are piped to gas systems or to smokeless flares. When adsorption of condensable vapors is not economically practical, these vapors are sent directly to the fuel system or incinerated in a smokeless flare.

IMPACTS: Vapor recovery units raise the potential for environmental hazards due to the high levels of concentrated organic vapors involved in the process. Uncontrolled concentration of vapors could cause fire, explosions, or emission releases. Also, equipment malfunction could result in numerous hazardous environmental conditions. Workers within the vapor recovery systems are exposed to risks within their working environment.

MITIGATION: Impacts from vapor recovery systems can be mitigated through strict enforcement of design, operation and maintenance standards. Applicants or operators of these devices must comply with various agencies' regulatory requirements, including the District's BACT requirements. Impacts from these sources will be mitigated to insignificance through regular inspection, monitoring and good housekeeping. In addition, the Occupational Safety and Health Administration acts to protect worker health by promulgating regulations.

SELECTIVE CATALYTIC REDUCTION

SETTING: The selective catalytic reduction (SCR) process uses NH_3 (ammonia) to reduce NO_x to N_2 and H_2O in the presence of a catalyst. This process has been widely accepted, and is required by the District's New Source Review as the best available control technology (BACT) for NO_x reduction.

SCR catalysts often contain small amounts of hazardous materials, including vanadium pentoxide (V_2O_5) and other heavy metals. In general, as the valence of vanadium compounds increases, the toxicity of vanadium depends

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also increases. The pentavalent vanadium compounds are considered the most toxic.

SCR catalysts typically have a lifespan of two to four years, depending upon the type of fuel used, impurities in the fuel, and the NO_x emission reduction efficiency required. SCR catalysts are either recycled or landfilled depending upon the manufacturer and the catalyst technology used.

IMPACTS: Particulates in the flue gas could erode the catalyst grids, thus producing and discharging vanadium pentoxide particulates in the flue gas. Vanadium pentoxide emissions could create a public health hazard.

Disposal of spent SCR catalysts could negatively affect solid waste disposal sites because of the increased amount of wastes generated. However, since catalysts may contain hazardous substances, vanadium pentoxide or other heavy metals, they may require disposal in Class I landfills. Currently, there are only two Class I landfills in California.

Treatment, handling and disposal of SCR catalysts raise the risk of public exposure to spent catalysts. This impact could also be intensified by the need to transport spent catalysts to off-site disposal facilities, thereby increasing transportation related hazard

MITIGATION: SCR storage and disposal impacts on hazardous waste disposal can be mitigated by strict enforcement procedures, maintenance of operating manuals and compliance with various agencies' regulatory requirements. Waste minimization will be encouraged to reduce the impacts of waste disposal and storage. Also, on-site treatment and handling will be encouraged as part of waste management practices. Therefore, to enhance proper facility design and operations, operators must comply with established regulatory standards.

Since no catalysts have been replaced and disposed of in California, the Department of Health Services has not yet determined whether spent catalysts encased in concrete should be classified as hazardous wastes. Therefore, it is uncertain whether spent SCR catalysts crushed and encased in concrete need to be disposed of in a Class I landfill.

County solid waste management plans are revised on a triennial basis and should take any changes in the quality or composition of hazardous wastes into account during the revision process. These revisions are currently under

way and stress conservation and recycling. Potential increases in landfill demand may constitute a significant adverse environmental impact. Mitigation of this impact is within the jurisdiction of the local government solid waste planning agencies, not the District. Mitigation measures on landfills and landfill planning can and should be adopted by those agencies. It is expected that effective solid and hazardous waste management programs will reduce the impacts from this source to insignificant levels.

ALTERNATIVE FUEL TECHNOLOGY

Substitution of alternative fuels for fuel oil, gasoline, and diesel fuel would either be required or encouraged by several of the transportation and stationary controls proposed in the AQMP.

Methanol

SETTING: The California Energy Commission (CEC) is investigating feasible alternatives to petroleum-based fuels. CEC has concluded that methanol is cleaner burning than all other fuels except hydrogen. The District has also endorsed methanol as an alternative to petroleum-based fuels.

IMPACTS: Methanol has approximately half of the energy content per equivalent volume as heating oil, gasoline, and diesel fuel. Therefore, about twice as much methanol would need to be supplied to the Basin and distributed as the energy equivalent volume of fossil fuels. As a result, increased volumes of methanol fuel transported into and distributed in the Basin may increase the risk presented by fuel use.

Use of methanol as an alternative fuel raises several safety issues. The high flammability of methanol poses the risk of fire during all stages of transport and storage. Although the auto-ignition temperature of methanol is relatively high (725° F), weak thermal ignition sources, such as sparks, matches, hot surfaces, or open flames, can cause ignition (DOE, 1982). In case of a methanol fire, water is ineffective for extinguishing flames. Therefore, chemical fire retardants rather than water must be used.

Furthermore, methanol is a toxic substance. The greatest risk associated with its use occurs during handling and transport. Yet the overall fire and explosion hazards do not appear to be greater for methanol than for gasoline (CCEEB, 1987). Although there is a widespread perception that methanol is more dangerous than gasoline to the consumer, laboratory and field studies show that exposure to methanol is no more harmful than exposure to gasoline. In fact, ingredients in gasoline that are known or suspected carcinogens (benzene and toluene) are absent in methanol. Methanol is also very corrosive to certain metals and rubber. As a result, storage and handling both at the distribution level and at self-serve fuel stations may be made more difficult.

Substituting methanol for conventional flammable fuels is not likely to require installation of additional fire protection facilities. However, local fire departments may need to augment protection capabilities in response to new methanol storage facilities. This may affect local budgets, but does not constitute an adverse physical environmental impact.

MITIGATION: To reduce exposure to methanol, OSHA (1978) recommends engineering controls to reduce environmental concentrations to permissible exposure levels (PEL). Respirators should be provided in case PEL levels are exceeded. In addition to respirators, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation. Employees should be provided with and required to use methanol impervious clothing, gloves, face shields, and other appropriate protective clothing and materials necessary to prevent repeated or prolonged skin contact with liquid methanol. Emergency showers and eye-wash fountains should be installed in case of skin or eye contact with methanol. To reduce the possibility of fires or explosions, all transport and storage containers would need to be insulated against exposure to external heat sources.

The requirements for assuring safe operation of a methanol-fueled facility are more stringent than those for a petroleum based liquid fueled facility, but similar to those of a natural gas-fired facility (Shore and Bemis, 1986). In a field test demonstration of methanol in industrial-sized gas turbine cogeneration unit (Shore and Bemis, 1986), the safety system for distillate fuel was upgraded to include vapor and fire detectors in the engine room and improved ventilation of the turbine enclosure. In the event of a leak or fire, this safety system could initiate an engine shutdown. Methanol is corrosive so the materials of construction [for tanks] were carbon steel up to the fuel

forwarding filters and stainless steel thereafter. Seals and gaskets used throughout the system were constructed of Buna-N, teflon, nitrile rubber, or other methanol compatible material. Welded connections were used preferentially in the piping system if possible.

Methanol has a low flame luminosity rating which can create a potentially dangerous fire hazard. Additives such as pentane can be used as flame colorants to increase the visibility of methanol flames (DOE, 1982). Addition of flame colorants will speed the detection of any methanol fires.

Transport of methanol by rail requires non-corrosive tank car linings to prevent leakage and thus reduce the possibility of explosion and fires. Properly attached bumpers or chassis extensions on all tank cars will protect them and other equipment from severe damage in the event of a collision. Posting warning signs explaining contents and hazards, as required by the Federal Code of Regulations (CFR, 1986), can alert individuals and facilities that transport or store methanol.

Natural Gas

SETTING: Natural gas-powered vehicles are a demonstrated alternative to gasoline powered vehicles. Both compressed natural gas (CNG) and liquified natural gas (LNG) are cleaner burning than fuel oil, gasoline or diesel fuel. Furthermore, natural gas can be used as an alternative to fuel oil in many industrial processes such as steam generation and process heating.

IMPACT: Compressed natural gas is gaseous at all ambient temperatures. Therefore, it would require special storage and vehicle tanks to reduce boil off. Storing liquified natural gas, although less bulky than compressed natural gas storage, must be stored in cryogenic containers to keep in liquid form. In the event of an upset, natural gas is safer than upsets of liquid fuels such as gasoline or methanol because natural gas is lighter than air. As a result, the fire dangers associated with liquid fuel spills are minimized.

Natural gas is a viable alternative fuel for many industrial and transportation uses. Because most industrial processes currently have the ability to use either fuel oil or natural gas as an energy source, increased reliance on the use of natural gas would not necessarily increase any risk associated with natural gas use.

In general, recovery and refining of natural gas outside the Basin and distribution by pipeline inside the Basin would be safer than the out-of-Basin manufacture and in-Basin shipping of either gasoline or methanol because delivery by truck, and the associated potential for accidents, could be avoided (DeLuchi, 1987). As in the case of methanol, an extensive refueling network would need to be established to deliver fuel to vehicles.

MITIGATION: Use of proper storage and handling techniques, particularly in the case of self-fueling stations, can help mitigate any risk presented by natural gas use. Because the gas disperses quickly into the atmosphere, there are no long-term impacts on the environment which need to be mitigated.

REFORMULATION OF SOLVENTS AND COATINGS

SETTING: Reformulation of coatings and product refinishing compounds is proposed in the AQMP to reduce ROG emissions.

IMPACTS: Exempt compounds (methylene chloride, trifluoromethane, dichlorodifluoromethane, etc.) would be used in coating and refinishing reformulation. To the extent that any of these solvents may be toxic yet not designated as toxic under the Tanner process, the risk of upset may be a potential impact. Methylene chloride is used extensively in paint stripper formulation and can be used for metal part degreasing. Substituting this compound for photochemically reactive solvents has the potential to produce adverse air quality impacts. Methylene chloride is currently considered a probable human carcinogen by EPA and is undergoing review for consideration as a toxic air contaminant under the Tanner process (AB 1807). A recent court decision prohibits regulation of potentially toxic compounds until they are designated as toxic substances by the Air Resources Board and the State Department of Health Services. Although some compounds, such as fluorocarbons and chlorofluorocarbons (CFCs), have been implicated in the observed depletion of the stratospheric ozone layer, the District prohibits substitution of compounds that would lead to depletion of this layer.

Because some of these compounds which could be used as substitutes may be regulated as toxic, reformulation as a ROG control measure for solvents and

coatings may decrease the number of solvents potentially available as substitutes.

MITIGATION: In order to mitigate impacts caused by reformulation using exempt solvents, adequate studies will be necessary to properly identify the effects of compounds used in reformulation of solvent and coatings. Strict regulatory practices coupled with materials and product compliance must be maintained in addition to good housekeeping practices. Manufacturers must prepare and maintain Material Safety Data Sheets (MSDS), with cautionary notes informing the user of potential risks associated with the use of the product. This requirement is in compliance with the provisions of Title III, (the Federal Emergency Planning and Community Right-to-Know Act of 1986). In addition, manufacturers must comply with section 313 of the Clean Air Act to establish an inventory of toxic chemical emissions from its facility.

These steps will protect public health and safety, and would therefore mitigate adverse environmental impacts which might be caused by exposure to hazardous or toxic materials from coating reformulation.

SECTION 4-10

POPULATION

Alternative Work Schedules and Locations

Mode Shift Strategies

Growth Management

Capacity Enhancements

ALTERNATIVE WORK SCHEDULES AND LOCATIONS

SETTING: Alternative Work Schedules and Telecommunications. Alternative work schedules and telecommuting by either working at home or in satellite work centers located near residential areas have been proposed in the Plan as a means of cutting emissions from home-to-work commute trips. Approximately 20% of the work force would adopt alternative schedules or locations, and an additional 20% would telecommute to work.

IMPACT: Modified work schedules to reduce Vehicle Miles Traveled or total trip ends are designed to cut emissions due to transportation demand and traffic congestion. In doing so, alternative work schedules may indirectly encourage population growth in suburban and urbanizing portions of the Basin, in both the short- and long-term. Some residents of these areas presently experience long commutes and congestion while travelling to jobs in core areas of the Basin. Fewer trips to work would make it easier for inland residents to reach jobs while maintaining households in outlying portions of the Basin.

Likewise, telecommuting would free some residents of the obligations of daily commuting, allowing them to live wherever they choose within the Basin. This may result in some beneficial reallocation of population in the near- and long-term to achieve a more efficient urban form for the Basin. While some people will locate near their work base, others may choose to live distant from their office, thus increasing the commute length for periodic visits to their work base. The potential magnitude of population relocation is not known at this time, but would depend on the number of affected workers, the availability and cost of housing, socioeconomic factors, and other individual preferences and trade-offs.

As proposed, this measure would focus on "information technology" personnel. While this job category is broadly defined, skilled telecommuting employees are likely to fall in the moderate and upper income levels. Thus, telecommuting options and the accompanying residential location flexibility would be available mainly to moderate and upper income levels. Although we tend to think of word processing as white collar, the pay puts people into the low and moderate income category. The impacts of alternative work schedules and telecommuting are further addressed in the Draft

Environmental Impact Reports for the SCAG's Growth Management Plan and the Regional Mobility Plan (SCAG, 1988).

MITIGATION: The selective impacts of telecommuting could be distributed more evenly throughout the Basin population by extending such programs to as varied a pool of jobs as possible. Also, increasing the percentage of employees involved would further spread the benefits. However, this must be balanced against the as yet unknown population distribution impacts of freeing a larger segment of the population from employment constraints on residential location.

MODE SHIFT STRATEGIES

SETTING: Several different measures have been proposed that would reduce emissions by encouraging people to shift from single-occupant vehicles to other modes of transportation. These measures include: Employer Rideshare and Transit Incentives, Parking Management, Merchant Transportation Incentives, Auto Use Restrictions, HOV Facilities, and Transit Improvements.

IMPACTS: Taken together, these control measures could beneficially change individuals' evaluation of employment location and commuting effort. Indirectly and over time, these measures would encourage some portion of the Basin population to relocate to areas with employment opportunities that require shorter, less complicated, less expensive commutes, or which provide more varied transit alternatives. This population redistribution is a beneficial impact. One negative side-effect of this overall benefit is that some residents may seek to move away from areas where the intensity of transit service increases and disrupts residential neighborhoods. Further discussion of the impacts of mode shift strategies can be found in the DEIR prepared for the Regional Mobility Plan (SCAG, 1988).

MITIGATION: Neighborhood disruption can be minimized through careful transit route and transfer point designation, along with provision of adequate bus turn-outs and bus shelters/seating to discourage patrons on nearby private property. Add increased security on buses and shelters/transfer points.

GROWTH MANAGEMENT

SETTING: The growth management measure proposes to balance jobs and housing in the Basin through local policies and planning activities. While the total Basin population would remain the same as that anticipated under strictly trend conditions, local policies would intervene in the trend distribution of jobs and housing to create greater balance within subregions. Lower emissions due to shorter commutes and more efficient travel patterns would result.

IMPACT: Growth management measures are intended to direct the amount and timing of housing, employment and/or trip growth in a given jurisdiction. However, these same measures may not reduce population growth at the same time. This outcome is highly likely due to the large percentage of the Basin's projected population growth attributed to natural increase. Families with children are less mobile, and less likely to leave the Basin, while the young and the affluent are those most likely to leave the region, or to decide against coming. This could enhance the observed trend toward an older and less mobile population.

Migrants from other parts of the United States may decide to forgo moving to the South Coast Air Basin, unless their local housing and employment conditions are less favorable than post-growth management conditions in the Basin. In contrast, foreign immigrants may not be dissuaded from locating in the Basin despite growth restrictions. The political and economic climate may be better in relative terms than their points of origin, and tighter housing conditions in the Basin may be no worse, and even better, than in their previous locations.

All of the above suggests that growth management could indirectly cause some redistribution of population, some small changes in the age and ethnicity structure, but no absolute change in the amount of population.

The Baseline Growth Projection shows a continuation of present trends toward high population growth rates in Orange, Riverside, and San Bernardino Counties - 48%, 161% and 139% respectively between 1984 and 2010. While Los Angeles County would increase only 27% during that period, it would nevertheless experience the largest absolute population gain.

In contrast, the Jobs/Housing Balance Growth Projection (GMA-4 Modified) would redistribute some of the population growth projected for current housing-rich areas to those that are relatively housing-poor. This "balancing" would be achieved by shifting 951,900 residents, or 5.2% of the projected 2010 population, from one area to another through strategic provision of housing opportunities; the total population would remain the same as that expected according to trend. These growth effects would be accomplished by shifting the location of existing residents, as well as new migrants or natural increase. As Table 4-10-1 indicates, this results in different county growth rates than those produced by trend:

Table 4-10-1
Population Shifts Under GMA-4 Modified

County	2010	Job/Housing Adjustment (% of 2010 Total Population)
Los Angeles	62%	+3.0%
Orange	19%	+4.3%
Riverside	9%	-11.7%
San Bernardino	11%	-11.5%

Whether these population shifts are beneficial or adverse to air quality is the subject of debate within the Basin. Proponents of a growth management approach to pollution reduction believe that a population distribution focussed on centers dispersed throughout the region will optimize commute lengths and times, thereby reducing congestion that would lead to pollution. Population centers also provide convenient targets for transit networks. While this intervention would yield increased population densities in older, more urbanized portions of the Basin such as downtown Los Angeles. Intensification could gravitate toward communities with cheap or recyclable land, rather than being dispersed among all cities within a county. Further, intensification could lead to some negative impacts including increased congestion, noise, crime and pressure on infrastructure and services.

Critics of growth management as a pollution control measure point out that suburbanization is a spontaneous response to congestion, one that promotes clean air by spreading jobs throughout the region to avoid the adverse impacts of congestion. Rather than generating long-haul commutes, they contend that suburbanization actually minimizes work trips. While low density population and job distribution makes efficient transit service difficult, these observers contend that 19th Century options such as fixed rail and subway transit are unsuited to the present-day mobility needs of the Basin. Still other critics of this approach claim that jobs/housing balance is occurring gradually without government intervention. They see a growth management measure as an unnecessary effort.

Regardless of which growth management alternative is ultimately favored, implementation of any growth management measure would be complex and controversial. Direct intervention in population increase by influencing births, deaths or immigration is beyond the District's purview. Nor does the District exercise authority over local land use and growth controls which would be needed as proxies to control the amount, timing, and location of population growth within the Basin. Thus, growth management strategies would have to be implemented through voluntary local government action, or through creation of some sort of joint powers authority created by mutual agreement of local governments. Full, Basinwide implementation of the measure could be economically or politically infeasible. Partial implementation of the measure could result in an unintended, skewed distribution of population and jobs that fails to improve jobs/housing balance or shorten commutes. The impacts of the growth management strategy are addressed in greater detail in the DEIR prepared for SCAG's Growth Managment Plan (SCAG, 1988).

MITIGATION: The Regional Housing Needs Assessment, as incorporated into local general plan housing elements, can assist in distributing housing and population shifts fairly among all of the jurisdictions impacted by growth management, so that a small handful of communities do not drastically gain or forego population. Regionwide and local infrastructure and service plans can also anticipate changing user needs as a result of population and density shifts prompted by jobs/housing balance efforts. Local government obstacles to jobs/housing balance such as land use plans or zoning codes that exclude employment-generating activities, or revenue-maximizing land use decision-making that excludes residential uses, can be removed.

CAPACITY ENHANCEMENTS

SETTING: The Freeway Capacity Enhancement measure proposes to cut auto and truck emissions by providing 875 new lane-miles of freeway to alleviate severely congested routes. Routes to be included in this total have been designated in Regional Mobility Strategy 3 developed by the Southern California Association of Governments.

IMPACT: The Regional Mobility Strategy would provide 875 additional lane-miles of freeway construction. Depending on the number and timing of routes funded and built, this strategy may impact population distribution in the Basin. New routes into previously undeveloped areas would direct population growth into urbanizing portions of the region. New routes may also displace significant numbers of residents through right-of-way acquisition, thereby altering local population trends. Likewise, improved access to congested areas may draw additional population growth to these popular areas, which could lead to increased densities. The DEIR for the Regional Mobility Plan provides more in-depth information on the impacts of capacity enhancements.

MITIGATION: Displacement of population due to freeway construction can be offset by required housing replacement programs within the affected community. Population densities in urbanized areas receiving increased access, and population distribution in urbanizing areas receiving new access can be influenced indirectly by the Regional Housing Needs Assessment (RHNA) developed by the Southern California Association of Governments. The RHNA can assist in spreading population growth equitably within the region by guiding the provision of a mix of housing for all income levels.

SECTION 4-11

HOUSING

Housing Impacts

GROWTH MANAGEMENT

SETTING: Four alternative growth management implementation strategies proposed in the Draft AQMP would impact the the availability and distribution of new units as well as the cost of new and existing housing. These four strategies would be used to implement either the trend-based Baseline Growth Projection, or the Jobs/Housing Balance Projection. Both projections would provide the same total number of housing units to the region, but would vary in their distribution.

IMPACT: A sizable percentage of Basin growth would occur within existing highly urbanized areas under the Baseline Growth Projection based on trend. New housing costs would be driven up by high land costs, expensive recycling and redevelopment, and scarcity of developable land. The Baseline Projection calls for housing growth of 26% in Los Angeles County, 33% in Orange County, 61% in Riverside County, and 60% in San Bernardino County. The region's housing stock would increase 36% overall.

The Jobs/Housing Balance Projection would shift some housing growth that would otherwise occur in urbanizing areas into job-rich highly urbanized areas. This would increase Los Angeles and Orange Counties' share of Basin housing over projected trend levels, placing more pressure on expensive recycling and redevelopment efforts to secure more housing to compensate for the lack of developable land. Table 4-11 below summarizes the shifts in housing growth that would occur when compared with the trend projection.

Table 4-11-1
Housing Growth Under Jobs/Housing Balance Projection

County	Housing (% of 2010 Total Housing)	Jobs/Housing Adjustment
Los Angeles	60.0%	+2.9%
Orange	19.0%	+4.7%
Riverside	9.0%	-10.6%
San Bernardino	12.0%	-11.1%

Four implementation strategies have been identified to realize the selected growth projection alternative. Each of these strategies holds housing impact implications:

The "Mitigation Strategy" of imposing developer fees on public and private projects would increase the cost of new units, with the added expense eventually passed on to consumers. This strategy could discourage the production of low and very low income housing units needed to comply with the state-mandated Regional Housing Needs Assessment, as mitigation fees would make up a larger percentage of the total unit cost. Since low and very low income households have little financial flexibility to pay these added costs through increased rents or house payments, profit margins would be uneconomic on these units. The scarcity of new units would in turn drive up the cost of existing units.

The "Regulatory Strategy" would limit development that could lead to job/housing imbalance. This could result in restricted housing growth in less developed areas until job growth catches up, which could curtail production of some of the Basin's most affordable housing. Urbanizing areas typically enjoy lower land costs and correspondingly lower housing costs. Conversely, this strategy would encourage housing production in job rich areas, where scarce residential land commands prices high enough to discourage the production of low and moderate income housing. Once again, conflicts with the Regional Housing Needs Assessment could occur. Lack of new units on the market would increase the value of existing units.

The "Investment Strategy" would control the amount and location of new housing via infrastructure provision, most notably new streets and sewers. This strategy would also increase the cost and scarcity of new housing throughout the Basin. Urbanizing areas would experience the most severe constraints due to the limited amount of existing infrastructure. Again, this would translate into loss of affordable housing units in the areas best suited to their production, given prevailing patterns of land value. Recycling and redevelopment of existing units to higher densities within older portions of the Basin would also be constrained by infrastructure limits. Although not triggered by air quality concerns, the dynamics of this strategy are currently being tested by the City of Los Angeles, which is limiting commercial and residential production to fit within sewage treatment capacity quotas.

The "Market Adjustment Strategy" calls for government intervention to promote concurrent housing, labor and transportation efforts to induce

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jobs/housing balance within a specific area. This could include eliminating existing housing limitations prescribed through land use and zoning. This measure could result in added new housing in areas not previously slated for housing growth, and could increase the stock of affordable units depending upon the availability and cost of land. Recycling and redevelopment projects in older areas could also benefit from this measure.

All of the above strategies are likely to conflict with existing state-approved housing elements and land use decision making authority. With the exception of the "Market Adjustment Strategy", they would all tend to reinforce current patterns of low and very low income household impaction, as these areas would become the least appealing for development, and the least likely to recycle into more mixed communities over time. The impacts of the growth management strategy are discussed in greater detail in the DEIR prepared for the Growth Management Plan (SCAG, 1988).

MITIGATION: Disincentives to produce low income and affordable housing under the "Mitigation Strategy" described above can be offset by development fee waivers, or in providing affordable housing incentives in locations more desirable from a jobs/housing balance point of view. Disincentives posed by the "Regulatory Strategy" can be reversed by subsidies for affordable and low income units, special density bonuses, or fee waivers for qualified projects.

Housing impacts associated with the "Investment Strategy" can be ameliorated by special consideration for affordable and low income projects, and/or reduced infrastructure fees.

FREEWAY CAPACITY ENHANCEMENTS

SETTING: The Freeway Capacity Enhancement measure proposes to cut auto and truck emissions by providing 875 new lane-miles of freeway to alleviate severely congested routes. Routes to be included in this total have been designated in Regional Mobility Strategy 3 developed by the Southern California Association of Governments.

IMPACT: New freeway construction to provide additional capacity in existing urban areas is likely to result in a loss of housing stock. Housing loss would occur in neighborhoods designated for freeway rights-of-way.

Regional Mobility Strategy 3 includes routes extending through South Pasadena (I-710 gapclosure); and communities along the Century Freeway alignment. In urbanizing areas, new freeway construction could result in a net increase in housing stock, as added capacity provides access to new housing and jobs. However, some residential land that falls within freeway alignments could be removed from inventory. Urbanizing areas that would be affected include Southeast Orange County (Foothill and San Joaquin corridors), and the Route 30 corridor extending from Azusa to Fontana. These effects are discussed in greater detail in the DEIR for the Regional Mobility Plan (SCAG, 1988).

MITIGATION: Housing losses due to freeway construction could be offset by housing replacement and relocation programs in adjacent areas. Judicious selection of alignments can also insure that the minimum number of units and neighborhoods are disrupted by the new facilities.

ENERGY CONSERVATION PRICING, TAX AND SUBSIDY INCENTIVES

SETTING: This measure is intended to reduce emissions due to residential and commercial energy consumption by providing regulatory incentives for energy conservation, pricing policies that discourage peak-period energy use, surcharges for excess use, and improved tax credits and subsidies to help pay for installation of conservation devices.

IMPACT: Weatherization programs aimed at reducing natural gas and electricity consumption would affect both new and existing housing units. The efforts would expand on voluntary efforts sponsored by utilities in the Basin. Installation of higher quality ceiling insulation, weatherstripping, caulking, water heater blankets, set back thermometers and ceiling duct, floor, and wall insulation would result in higher new home costs, and retrofit costs for existing units. The cost of installing these features may be out of the reach of very low, low and moderate income households, even though initial expenditures are expected to be recouped many times over from energy savings.

MITIGATION: Low interest loans, cash rebates or tax credits can overcome financial barriers to compliance with the proposed measure. California's

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original Weatherization Financing and Credits Program was discontinued in March, 1986, but a similar program could be revived. In addition, utility-sponsored weatherization audits can assist homeowners in identifying the most cost-effective means of conserving energy.

SECTION 4-12

TRANSPORTATION

Tier I Measures

Tier II Measures

Tier III Measures

TIER I MEASURES

Motor Vehicles

Urban Bus System Electrification

SETTING: This measure calls for electrification of diesel powered transit buses using conventional overhead wires for transmission. Electrification would be installed only on major fixed routes. Electrification will provide emission reductions from the high level produced by diesel buses.

IMPACT: This measure would introduce overhead trolley wires for power transmission to transit buses operating along major fixed routes. As a result, routing flexibility would be somewhat constrained in central business districts. Electrified streets could experience greater transit vehicle congestion than at present, as some bus routes are shifted to these streets in order to keep electrification equipment on designated streets in an attempt to minimize physical impacts and costs.

Some reconfiguration of bus routes may be necessary to merge and interface electrified routes with non-electrified routes. This could lead to transit buses on streets not previously experiencing bus traffic.

MITIGATION: Coordination among local planning agencies and transit providers can result in careful selection of appropriate routes for electrification. In some cases, this may require new route configurations to avoid conflicts with sensitive land uses and to generally avoid affecting neighborhoods with more intense traffic. Parking and traffic enforcement, particularly during peak hours, can also alleviate some of the added congestion that could occur.

Clean Fuel Retrofit of Transit Buses

SETTING: A substantial portion of the transit bus fleet would be converted to alternate clean fuels technology. Diesel buses would be retrofit for use of methanol, compressed natural gas, propane, liquefied natural gas or some

other clean fuel product. Conservation of clean burning fuels will provide emission reductions from the high level produced by diesel buses.

IMPACT: Conversion of buses to clean fuels could be costly for transit operators, as new or retrofit buses are phased in over an 8 to 16 year turnover period. Expansion of new routes and other service improvements could be curtailed during this turnover, as funds are devoted to clean fuel improvements. This outcome would conflict with the increased service required by transportation control measure 2-G, Transit Improvements, during the early years of conversion to clean fuels. However, lower operations and maintenance costs in the long run could minimize this short-term impact.

MITIGATION: Earmarking sufficient funds at the federal, state, and/or local level will help ensure that transit operators can systematically convert their fleets to clean fuels without sacrificing route expansion and other service improvements to increase efficiency and convenience.

Transportation System and Land Use

Disincentives for Idling at Drive-Through Facilities

SETTING: This measure calls for restrictions on the design of new drive-through facilities or outright prohibition of new drive through facilities in order to reduce emissions caused by idling.

IMPACT: Design, location, and construction controls on drive-through facilities have the potential to improve local circulation while achieving emission reductions. Local traffic congestion due to vehicles entering, exiting, or queuing for drive-through facilities would be reduced or eliminated, which would also bring secondary safety benefits.

MITIGATION: No negative transportation impacts would require mitigation.

Limitations on Vehicle Registration

SETTING: Limitations on vehicle registration are intended to limit the number of gas and diesel powered vehicles in the Basin, and would cut the

6.5 million vehicles expected in 2000 by 5%. This reduction would translate into lower emissions from automobiles and trucks.

IMPACT: The district estimates that limitations on the number of vehicles registered to operate in the Basin could reduce the vehicles operating in the year 2000 by 5%, or 325,000 vehicles. Transportation impacts would depend largely upon which vehicle operators forego ownership due to high costs or registration caps. Peak hour congestion could be reduced as affected vehicle owners shift to transit and other alternative modes. This would increase Average Vehicle Ridership and reduce Vehicle Miles Travelled. However, if only second or third vehicles per household are removed from circulation, peak hour travel may not show reductions commensurate with the number of vehicles removed from service. Non-work trips, one of the fastest growing sources of emissions, could also be reduced by this measure.

Some vehicle owners may attempt to circumvent limitations by registering their vehicles outside the region. This would reduce any congestion relief that would otherwise be expected to occur.

MITIGATION: Registration limitations that focus on geographic areas that offer good transit service could help ensure that vehicle reductions translate into fewer trips, particularly during peak hours. Strong enforcement programs could improve compliance and limit the number of illegally registered vehicles that could prevent significant congestion relief from occurring.

Alternative Work Schedules and Locations

SETTING: Alternative work schedules and telecommuting by either working at home or in satellite work centers located near residential areas have been proposed in the Plan as a means of cutting emissions from home-to-work commute trips. Approximately 20% of the work force would adopt alternative schedules or locations, and an additional 20% would telecommute.

IMPACT: Alternative work week schedules and flextime arrangements for 20% of the work force would provide an estimated longterm reduction of 2.56 million work trips, 27.60 million Vehicle Miles Traveled, and 1.94 million Vehicle Hours Traveled each day. This represents a decrease of 6.34% trips, 6.83% VMT, and 8.61% VHT in relation to the baseline trend

projection. This reduced demand would relieve peak hour congestion, and lessen the number of transit and road improvements that would otherwise be required to accommodate trip growth through 2000.

Like alternative schedules, telecommuting would reduce peak hour congestion and fuel consumption. Assuming that 20% of the workforce participates in this effort; work trip, VMT, and VHT reductions would be identical to those cited above for alternative work weeks, thus doubling the congestion relief from this package of measures.

These improvements would be partially offset by non-work trips which SCAG predicts will increase 5%, as workers use their free time to run errands and similar trips. This increase is less than current growth rates for non-work trips.

For telecommuting, in particular, transportation impacts will be greatly influenced by worker behavior that occurs as a result of working at or near home. Some telecommuters may choose home locations further from their work base, thus increasing their total commute miles and hours because they need to commute less frequently. Or, they may be freed to make an increased number of short trips during the day because their work schedule may be more flexible. The impacts of telecommuting, as well as alternate work schedules, are discussed in greater detail in the Draft Environmental Impact Reports prepared for the Regional MObility Plan and SCAG's Growth Management Plan (SCAG, 1988).

MITIGATION: Improved local transit service can assist in controlling growth in non-work trips that might otherwise occur on free days or as a result of more flexible hours. Local governments and employers may be able to offer incentives such as affordable housing and convenient local work centers to encourage employees to consider jobs/housing balance in their location decisions despite the reduced need to travel to the work base. In addition, local land use plans can provide for adequate bicycle and pedestrian options for short work trips, as well as mixed residential and commercial development.

Mode Shift Strategies

Employer Rideshare and Transit Incentives

SETTING: This measure requires trip reduction programs from public and private employers of 25 or more persons, as well as from building owners/managers of work places with multiple tenants employing 25 or more persons. These programs will reduce the number of vehicles on the road during peak hours, cut congestion, and thereby lower emissions.

IMPACT: Employer Rideshare and Transit Incentives would provide home-to-work trip reductions that result in less congestion and reduced emissions. It would enhance and extend the trip reduction benefits associated with District Regulation XV, which requires employers of 100 or more persons to develop and implement trip reduction plans designed to achieve a greater number of employees per vehicle during the a.m. peak hours, by including all employers of 25 or more persons.

Transportation benefits associated with this measure include reduced peak hour congestion, more efficient use of transportation facilities, reduced parking needs for employers, and an increased number of commuters available for ridesharing matches. In the long-run, this measure could motivate employer/employee matches that minimize commuting and facilitate ridesharing. The impacts of mode shift strategies are presented in greater detail in the Regional Mobility Plan DEIR (SCAG, 1988).

Transportation impacts from this measure include employee adjustment to alternative travel modes. In addition, smaller employers and multi-tenant buildings as well as businesses with flextime and alternative schedules may find it easier to comply with regulations designed to raise the Average Vehicle Ridership of the Basin's urban areas.

MITIGATION: Employee resistance to using alternative modes of travel can be counteracted by more convenient transit and ridesharing options, with the need to transfer or wait eliminated to the greatest degree possible. Financial motivations in the form of "parking rebates" or employer-paid transit passes can also ease resistance.

Multi-tenant buildings or employers that find ridesharing matches difficult to achieve due to flextime incompatibilities can mitigate their situation by joining a transportation management association that pools the employees of many businesses to increase the possible carpool and vanpool matches.

Parking Management

SETTING: Parking management controls are designed to reduce emissions by discouraging the use of private automobiles in congested areas including shopping centers and job centers by means of scarce and/or expensive parking. This measure also calls for park and ride lots and shuttle services to help meet the needs of persons who do not use their car to gain access to these areas.

IMPACT: Full implementation of this measure would contribute to shifting 6% of work trips to transit by eliminating 1.73 million auto work trips logging 18.39 million vehicle miles traveled, as a result of the full package of mode shift measures. High parking costs, parking prohibitions, and limited parking supply will be the primary tools of parking management.

Two positive impacts of parking management are decreased traffic congestion due to increased transit ridership and use of other alternatives to single-passenger autos; and more efficient traffic flow due to the reduction in vehicles. In addition, parking construction costs could be reduced as a result of lower parking requirements. However, negative impacts will also be associated with full implementation of this measure: some businesses may lose convenient auto access; some areas that do not experience congestion may be needlessly impacted if the measure is applied uniformly throughout the region; lower congestion due to parking restrictions may indirectly encourage new traffic growth which could offset any gains.

The total number of parking facilities needed in the region may remain constant, but be redistributed as the number of parking facilities within work centers remains static, while the need for remote park and ride lots increases. Parking management strategies and their impacts are also discussed in the DEIR for the Regional Mobility Plan (SCAG, 1988).

MITIGATION: Less urbanized portions of the Basin could be exempted from this measure, as parking restrictions would be ineffective if supply is not at or near absorption. Further, loss of auto access can be handled most

directly by local land use plans that establish where parking should be located and how it should be distributed.

Vanpool Purchase Incentives

SETTING: Vanpool purchase incentives are intended to cut emissions by reducing the number of vehicle trips and vehicle miles travelled during the peak hour commute period. Vanpools established by employers would provide mobility for employees who leave their cars at home.

IMPACT: Within five years, the Vanpool Purchase Incentives measure would lead to a 15% increase in the number of vanpools over 1984 levels; this would grow to a 30% increase by 2000 as a result of longterm implementation. This measure would target roughly a 20% segment of total trips.

In concert with other mode shift measures, Vanpool Purchase Incentives would contribute to a 6% mode shift which would eliminate 1.73 million work trips daily, a 4.27% decrease over baseline projection levels.

In doing so, this measure reduces Vehicle Miles Traveled; improve traffic flow, encourage a more balanced mode split, and facilitate the introduction of clean fuel fleet vehicles. It also would reinforce the goals of Regulation XV by increasing Average Vehicle Ridership during peak hours.

No negative transportation impacts have been identified

MITIGATION: No mitigation measures are required.

Merchant Transportation Incentives

SETTING: This measure calls on the owners, managers, and/or developers of retail establishments to provide facilities for bicycle or pedestrian access as well as other inducements for customers to shift from their cars to alternative modes of transit. Emissions would be lowered as a result of the reduced number of trips and vehicle miles travelled attracted by the retail establishment.

IMPACTS: This measure would primarily affect local transportation and non-work trips. Within five years, the measure would shift 1% of all trips of

3 miles or less to bicycle; 10% of trips of 1/2 mile or less to walking; and 12% of all single occupant auto trips to carpools of 2 or more passengers. These diversions would increase to 2%, 20%, and 32% respectively by 2000. Combined with other mode shift strategies, this measure would contribute to reducing growth in non-work trips to 5% of 1984 levels.

Several beneficial impacts would ensue: Vehicle Miles Travelled would be reduced; local traffic flow would be improved; the modal split would become more balanced; and bicycle and pedestrian transportation facilities would be increased.

No negative transportation impacts have been identified.

MITIGATION: No mitigation measures would be required.

Auto Use Restrictions

SETTING: Auto use restrictions are designed to reduce emissions by eliminating trips to congested areas such as special event centers, job and retail centers. Improved transit access would be provided to meet the mobility needs of persons leaving their cars at home.

IMPACTS: This measure would reduce an unspecified number of auto trips as a result of parking restrictions, transit options and incentives, restricted vehicle access, and special event access programs. In the long-run, access to major activity centers would be limited to transit, shuttles, non-motorized modes, and autos with 2 or more passengers.

Along with other mode shift strategies, this measure would cut work trips by 1.73 million and increase Average Vehicle Ridership. Central business district and major activity center traffic would be diminished.

Positive transportation impacts include improved local traffic flow, reduced VMT, a more balanced modal split, reduced need for parking facilities, improved availability of bicycle and pedestrian facilities, and improved transit service.

Negative impacts focus mainly on passenger convenience and resistance to using less convenient alternative modes of travel to the private automobile.

MITIGATION: The perceived inconvenience of travel to major activity centers by alternative modes can be ameliorated by readily available park and ride lots, express transit service to eliminate inconvenient transfers, and event and work schedules that allow flexibility for using public transit. An overall increase in transit service would be the major antidote to perceived inconvenience.

HOV Facilities

SETTING: The HOV facilities measure would provide 983 miles of new HOV lanes to encourage commuters to rideshare. The reduced congestion that would result will also lower emissions.

IMPACT: The HOV Facilities measure calls for construction of 983 lane-miles of dedicated HOV facilities throughout the Basin. These facilities will encourage the formation of an unspecified number of carpools in the region, leading to beneficial reductions of total vehicle trips, Vehicle Miles Traveled, and total travel time expended. These benefits would accrue over the next twenty-two years.

Negative transportation impacts of this measure focus mainly on disruption of local traffic due to HOV lane construction.

This measure will contribute to an overall reduction of 1.73 million daily trips as a result of the full array of mode shift strategies. The impacts of construction of HOV facilities are discussed in greater detail in the DEIR for the Regional Mobility Plan (SCAG, 1988).

MITIGATION: Careful construction scheduling and implementation can provide the new facilities with the minimum disruption to local traffic. Such scheduling and implementation can include seasonal and time-of-day variations to avoid peak travel periods to the degree possible. Mode Shift Strategies

Transit Improvements

SETTING: This measure is intended to reduce mobile source emissions by inducing shifts in transportation modes, from light and medium duty vehicles to transit vehicles. The measure would provide significant new transit

alternatives to auto use in the form of heavy rail, light rail, commuter rail and new bus routes.

IMPACT: The Transit Improvements measure would introduce 397 new track miles in the Basin, including 11 heavy rail corridors, 5 light rail corridors and 2 commuter rail lines. Construction of these new routes would be supplemented by 112 park and ride lots and 2,131 new buses in service.

Taken together, these improvements could eliminate 185,000 home-to-work auto trips per day. This long term benefits would contribute to a 6% shift in favor of transit modes, and would help achieve a reduction of 1.73 million vehicle trips due to mode shift strategies. These impacts will lead to decreased peak hour congestion, improved freeway and surface street speeds, and a more comprehensive transportation system that better serves all sectors of the Basin. Transit dependent residents of the Basin would benefit from increased mobility. The effects of transit improvements are discussed in more detail in the DEIR for the Regional Mobility Plan (SCAG, 1988).

Negative impacts center on local traffic congestion due to route construction, and the introduction of new or more intense transit traffic in neighborhoods. Project Alternative Impacts: The 1982 AQMP did not contain an HOV measure and would thus not entail the above impacts.

MITIGATION: Transit providers and local planning agencies can work together to designate routes that will minimize neighborhood disruption, and spread the positive as well as the negative benefits associated with transit corridors among neighborhoods.

Goods Movement

Truck Dispatching, Rescheduling, and Rerouting

SETTING: This measure alters truck delivery schedules by re-routing trucks away from central business districts and major activity centers during peak commute hours. Deliveries would be scheduled to off-peak hours or restricted to specific freeway/highway routes during morning and evening peak hours.

IMPACT: This measure would reroute traffic away from the Central Business District and off freeways during the peak a.m. and p.m. commute

periods. Controls would be implemented to require through truck trips to bypass Interstate 405, Interstate 5 and Interstate 10 to further ease congestion on these routes. Shipping and receiving plans, special truck operations and computerized navigation and dispatching systems would be instituted to reschedule and reroute trips away from peak period congestion.

This reduction in truck traffic would ease traffic flow and improve peak hour speeds; moreover, it would significantly cut accidents involving trucks, which have the greatest potential to cause peak hour delays. Short-term experience with truck rescheduling and rerouting during the 1984 Olympics showed a 58% decline in the normal truck accident rate.

This control measure would reduce truck trips during the peak period by 50%. This translates into a reduction of 9.0 million Vehicle Miles Travelled, and 239,000 hours of reduced traffic congestion due to accidents.

Negative transportation impacts due to this measure include increased truck traffic, reduced speeds and increased truck accidents on routes in outlying portions of the Basin that accept through truck trips during the peak hour. Some potential VMT savings will be foregone by the added distance that bypassing trucks must travel in some cases.

MITIGATION: Negative impacts caused by this measure can be reduced by designating sufficient alternative bypass routes around the most urbanized portion of the Basin, and by minimizing the peak hour restrictions to the narrowest time span possible. In addition, improved truck accident response efforts can help compensate for any increase in truck accidents and attendant delay along these bypass routes. Coordinating of truck delivery schedules can further reduce truck accidents and congestion in areas experiencing heavy truck activity.

Traffic Flow Improvements

SETTING: This measure will reduce emissions due to congestion caused by freeway queuing, poorly synchronized signals, and inefficiently channeled intersections throughout the Basin.

IMPACT: Traffic Flow Improvements would include metering 600 of the remaining 661 unmetered freeway ramps in the Basin; Automated Traffic Signal And Control (ATSAC) and similar computerized traffic signal control

systems at 4,700 intersections as well as other appropriate synchronization systems at 3,300 signalized intersections; and more efficient channelization of existing roadways at 300 to 500 intersections throughout the Basin.

The major benefit from this measure would be a reduction of 750,000 to 1,000,000 daily vehicle hours of delay. Improved congestion and travel speeds would follow. These improvements, along with the other impacts of traffic flow improvements are discussed in the DEIR for the Regional Mobility Plan (SCAG, 1988).

As a negative consequence, this measure could also redistribute traffic to areas previously less impacted by traffic.

MITIGATION: Negative transportation impacts can be reduced by interjurisdiction cooperation to synchronize signalization, and to coordinate routes to be synchronized. Traffic signals and other controls on streets adjacent to synchronized routes can eliminate many spillover effects.

Nonrecurrent Congestion

SETTING: Nonrecurrent congestion can be caused by traffic accidents, law enforcement activity, special event traffic, and nearly any other visual distraction or physical obstacle in the roadway. This measure would eliminate as many causes of nonrecurrent congestion as possible by expanding and improving incident response programs, improving enforcement practices, and increasing enforcement of vehicle load and safety codes.

IMPACT: Nonrecurrent congestion accounts for an estimated 50% of total congestion within the Basin. Major Incident Response to lane-closing freeway accidents, night schedules for lane-closing freeway maintenance, truck accident prevention programs, and general prevention programs aimed at minimizing minor visual and physical distractions on freeways would improve the performance of the transportation system. Congestion would be alleviated and overall traffic flow and speed improved. Major accidents would be reduced from the current annual average of 300, and the duration of those that occur would also be reduced. Approximately 750,000 vehicle hours of annual congestion delay would be eliminated, based on quick response to 67% (200) of annual major incidents.

MITIGATION: Inconvenience caused by periodic closures of freeway lanes or segments for night maintenance or to clear heavy congestion can be offset by a freeway closure/incident warning system. Such a system could include improved highway advisory radio bulletins, freeway information signs, and designated detours.

Airport Ground Access

SETTING: This measure would reduce the number of air passenger trips generated by airports, as well as congestion on the airport ground access system. Increased transit access and off-airport terminals are means of cutting emissions from ground access trips.

IMPACT: Efforts to reduce airport-related trips and congestion would focus on trip reduction programs, consolidation of airport facilities, and ground access improvements including road extensions and widenings, transit improvements, and transportation management measures. These controls would affect the physical transportation system in areas immediately adjacent to airports, as well as its performance.

Access route extensions and widenings would add an unspecified number of lane-miles to local surface street networks in and around airports. The freeway network would be impacted to the extent that new on- and off-ramps are part of the ground access controls. In addition, signs, signalization, and other physical improvements would be built in some locations. This could lead to some short-term negative impacts due to construction on adjacent land uses; as well as some longterm impacts such as increased airport-related traffic and spillover effects in new locations near airports.

Performance of airport access networks would be improved by reducing the total number of vehicles that would otherwise be attracted through carpooling, transit ridership, and shuttles. Some aircraft departures would be shifted to off-peak hours to spread airport-related traffic over the entire day. As a result, congestion and traffic delay would be reduced, and speeds would improve. This measure would eliminate an estimated 266,034 Vehicle Miles Traveled by 2000, and 349,321 VMT by 2010. Average Vehicle Ridership would increase from the current 1.18 passengers per vehicle to 1.5 AVR in 2000 and 2010.

MITIGATION: Short-term construction impacts associated with route extensions can be mitigated by construction management and scheduling during off-peak hours to minimize physical and visual distractions to airport traffic, as well as other local traffic. Long-term traffic effects on adjacent land uses can be controlled by limited access, signage, parking restrictions, signalization and enforcement of traffic laws, and local land use and zoning regulations designed to improve compatibility with airport traffic and uses.

Rail Consolidation

SETTING: Rail consolidation would result in a single, major railroad corridor along Alameda Street connecting downtown Los Angeles with the Ports of Los Angeles and Long Beach. This consolidated line could be extended east to the San Bernardino area. The consolidation would minimize the number of grade crossings and the congestion that occurs due to train crossing delays, which would result in lower emissions from idling automobiles.

IMPACT: This measure would consolidate the operation of several rail lines connecting the Ports of Long Beach and Los Angeles with distribution facilities in downtown Los Angeles; the alignment would parallel Alameda Street. The consolidation effort would result in increased and improved track facilities along the rail corridor, at least 16 grade separations at major intersections, and vacation of other north-south tracks currently in use.

These physical alterations would induce short-term construction impacts on local traffic. Long-term traffic impacts on non-grade separated streets that cross the new tracks would include more frequent train delays at a smaller number of intersections. Despite these local impacts, overall performance of the road system would be improved.

The measure would reduce vehicle delays due to train crossings by 78%; 4,143 vehicle hours of delay per day would be saved by 2000. In addition, rail system performance would be improved.

Train stoppages would be reduced by 74%, trains hours of operation would be reduced 29% (14.5 hours), and train speeds would increase 50% from 20 to 30 miles per hour.

MITIGATION: Disruption to local and train traffic due to construction of new tracks and grade separations can be mitigated by off-peak and phased construction schedules, designation of appropriate detours, and additional traffic enforcement on affected streets to ease congestion.

Long-term mitigation of the impacts of more intense train traffic along a single corridor can be addressed over time through compatible land use designations and zoning in local plans. Long-term surface street traffic delays can be eased by physical improvements such as increasing the number of grade separated intersections, as well as transportation management such as limiting the length of trains and resultant train delays, and restricting train delays to off-peak hours.

Paved and Unpaved Roads and Parking Lots

Storage and Movement of Fine Particulate Materials and Unpaved Roads and Parking Lots

SETTING: Controls on storage and movement of fine particulate materials, such as truck bed covers and liners, would reduce fugitive dust emissions during hauling. Likewise, controls on unpaved roads and parking lots would reduce dust emissions caused by vehicle movement over unpaved areas and wind erosion.

IMPACT: Both of these measures seek to control particulates; 11-A does so through transportation system performance, while 11-B would modify transportation facilities.

By requiring truck bed liners and covers to prevent loss of particulate matter during transit, 11-A would reduce the number of accidents and traffic delays and congestion due to spilled loads of particulate matter on freeways and surface streets. This would also reduce transportation maintenance requirements. No specific estimates of transportation system performance improvements are available.

Measure 11-B would result in paving of the Basin's estimated 4,150 miles of unpaved roads (Source: Caltrans 1986 Road Inventory) and undetermined acres of unpaved parking lots and maneuvering areas. While it increases the amount of paved parking facilities in the Basin, this measure would not appreciably influence transportation system performance.

MITIGATION: By paving, and therefore formalizing, parking areas, this measure may increase parking in locations that conflict with the intent of parking management controls proposed in measure 2-B.

This can be mitigated through local land use planning and zoning to control the amount and location of parking available.

Freeway Capacity Enhancements

SETTING: The Freeway Capacity Enhancement measure proposes to cut auto and truck emissions by providing 875 new lane-miles of freeway to alleviate severely congested routes. Routes to be included in this total have been designated Regional Mobility Strategy 3 developed by the Southern California Association of Governments.

IMPACT: This measure is predicated on implementation of Regional Mobility Strategy 3 developed by the Southern California Association of Governments. The effects of this strategy are presented in greater detail in the DEIR for the Regional Mobility Plan (SCAG, 1988).

The measure focuses on improving the efficiency of the existing transportation network by decreasing demand and modestly increasing freeway facilities.

Physical impacts would stem from the construction of 875 lane-miles of freeway by 2010, including the I-710 gap closure between Los Angeles and Pasadena, the Century Freeway, Route 30 in San Bernardino County, the I-15 Norco gap closure in Riverside County, and the Eastern, Foothill and San Joaquin Corridors in Orange County. (In addition, measure 2-F calls for 983 lane-miles of High Occupancy Vehicle Lanes would be constructed on nearly every existing freeway.)

These physical improvements would result in improved transportation system performance. Vehicle Miles Traveled would be 4% (15,547,000) less than the level expected in 2010 without this measure. Vehicle Hours Travelled would drop 11% (2,455,000). However, the system would accommodate the same number of total trips.

Construction of the new freeway facilities will disrupt both local and through traffic in the short-term. In the long-run, surface street traffic would need to

be rerouted in some locations and more intense traffic could be expected near freeway ramps.

MITIGATION: Short-term freeway construction impacts could be alleviated through careful phasing, off-peak work schedules, designation of appropriate detours, and increased traffic enforcement on impacted surface streets. Long-term traffic intensity adjacent to the new routes can be offset by compatible local land use designations and zoning controls, as well as appropriate land buffers, signalization, traffic enforcement, and appropriate signs.

Railroad Electrification

SETTING: This measure calls for electrification of 90% of the railroad lines in the Basin. Overhead or third rail distribution systems would distribute energy to the train, bypassing the need for diesel locomotive. This measure would reduce diesel emissions.

IMPACT: Railroad electrification would modify current rail facilities by adding an overhead or third rail electrical distribution system to transmit energy to locomotives. Only major lines would be electrified, but this would constitute 90% of the track-miles in the Basin.

Candidate routes include the Southern Pacific San Pedro Branch (Los Angeles to the Ports of Long Beach and Los Angeles), the Santa Fe Main Line (Los Angeles to Barstow), the Union Pacific main line (Los Angeles to Riverside and Yermo), the Southern Pacific main line (Los Angeles to Colton and Indio), and the Southern Pacific coast line (Los Angeles to Oxnard).

Construction of the electrification facilities would disrupt both surface street traffic at affected railroad crossings as well as train traffic.

While route alignments would not change as a result of this measure, the distribution and efficiency of rail traffic would likely be affected by electrification. Fewer locomotives would be required, as a 6,000 horsepower locomotive can pull twice the load of a 3,000 horsepower diesel locomotive, and are twice as durable (30 to 40 years) as diesels.

Growth in rail traffic would be concentrated on electrified lines. Congestion at interchange points between the electric and diesel rail systems could increase, as locomotives will need to be exchanged.

MITIGATION: Short-term negative impacts associated with installation of electrified lines can be mitigated through phasing of improvements. Rail cars can be diverted to alternate lines where available, or rescheduled outside of construction hours. Surface street traffic can be mitigated by scheduling construction during off-peak hours, providing appropriate detours and surface traffic enforcement for the duration of construction.

High Speed Rail

SETTING: This measure calls for construction and operation of a high speed rail line connecting San Francisco with the Basin. High speed rail service would satisfy significant demand for air connections to San Francisco, resulting in lower aircraft emissions and lower emissions from ground traffic attracted by airports.

IMPACT: Establishment of a high speed rail line between Los Angeles and San Francisco would cause physical changes to the transportation network and redistribution of trips from air to rail. In turn, these two types of impacts would result in further long- and short-term impacts on freeway and surface street traffic.

A new rail corridor extending through the Basin toward San Francisco would need to be constructed to accommodate magnetic levitation or similar rail technology. Because of the rapid service (250 to 300 miles per hour), high speed rail would be likely to divert some passengers from air travel to rail travel as well as to handle the excess demand for aviation access to northern California destinations within approximately 400 miles of the Basin's airport. Likewise, some auto travel between the Basin and San Francisco would be diverted to high speed rail. SCAG estimates that 20 million annual passengers could be accommodated by such a system.

Short-term construction-related traffic disruption would occur along the alignment selected. High speed rail would attract additional traffic to the areas in which stations are located. However, the system could reduce traffic attracted to airports as a result of diverting passengers. Surface street traffic will also be disrupted on a long-term basis by train crossings.

MITIGATION: Traffic disruption due to high speed rail route construction can be minimized by construction phasing, scheduling work during off-peak periods, designation of appropriate detours, and increased traffic enforcement in the affected area. In the long-term, traffic disruption at intersections along the line can be reduced or eliminated by building grade separated crossings and minimizing the number of crossings through street closures and route alignment. Increased traffic intensity in around rail stations can be alleviated by implementing parking management, increasing transit access, synchronizing signalization, and providing increased traffic enforcement.

Growth Management

SETTING: The Growth Management measure proposes to balance jobs and housing in the Basin through local policies and planning activities. While the total Basin population would remain the same as that anticipated under strictly trend conditions, local policies would intervene in the trend distribution of jobs and housing to create greater balance within subregions. Lower emissions due to shorter commutes and more efficient travel patterns would result.

IMPACT: This measure would impact transportation system performance. By redistributing home-to-work travel demand, growth management would reduce congestion and travel delays, while improving traffic flow, speed, and safety on routes leading to job-rich areas. Likewise, this measure would increase traffic intensity in housing-rich areas by introducing more job-generating uses. As a result of these performance characteristics, growth management would reduce the demand for increased freeway facilities in the urbanized core of the Basin, but could create sufficient demand for new routes to provide better access to new job concentrations in housing-rich areas. Further discussion of these impacts can be found in the Growth Management and Regional Mobility Plan Draft Environmental Impact Reports (SCAG, 1988).

MITIGATION: The demand for new routes can be controlled to some degree through interjurisdictional cooperation to ensure that job growth is distributed to areas most able to accommodate it. Increased local traffic due to new job growth can be offset by simultaneous provision of transit alternatives and ridesharing incentives, and transportation system

management techniques including signal synchronization and parking management.

TIER II

Goods Movement

Diverting Port-Related Truck Traffic to Rail

SETTING: Diversions of port-related truck traffic to rail will reduce container truck traffic from the Ports of Long Beach and Los Angeles to downtown rail yards. Near-dock and on-dock loading yards would handle the cargo diverted from the trucks. Emission reductions would result from the reduced number of trips and vehicle miles travelled by container trucks.

IMPACT: Establishment of on-dock and near-dock container transfer facilities will reduce trips on the two major routes connecting the urban core with the Ports of Long Beach and Los Angeles, the Long Beach (7) and Harbor (110) Freeways. Fewer truck trips will also lower the truck accident rate on these two facilities. 260,000 truck trips would be eliminated by 2000, growing to 980,000 in 2010. This yields a 6.04 million Vehicle Miles Traveled per year reduction by 2000, and 22.45 million per year in 2010.

While truck trips would be minimized by these transfer facilities, SCAG estimates that train traffic connecting the transfer points with downtown Los Angeles would increase 600 additional trips by 2000, and 2,250 additional trips in 2010. Increased train traffic would cause some negative impacts on local traffic as a result of delays at railroad crossings, as well as increased safety issues at these crossings.

MITIGATION: Negative impacts due to increased train traffic can be addressed by consolidating rail lines to the degree possible so that fewer surface streets and fewer intersections are affected by railroad crossings. Crossing delays and safety concerns can be ameliorated by grade separations at affected intersections as detailed in proposed measure 10, Rail Consolidation. Further, trains traffic could be curtailed during peak hours to

minimize crossing delays that would exacerbate commuter traffic and increase safety problems.

TIER III

Highway Electrification and Automation

SETTING: Highway electrification and automation would provide alternative means of fueling and efficiently operating vehicles. This measure calls for research and development, as well as demonstration projects, to bring the necessary technology to fruition,

IMPACT: Highway electrification would cause physical impacts to transportation facilities, as a result of installing an electrified element in the roadbed. This would result in short-term traffic disruption during installation. Vehicle automation would also impact performance of the transportation network. Traffic flow, speed and safety would improve as a result of speed control, signal preemption, vehicle spacing, braking, merging and passing maneuvers, obstacle detection, electronic route guidance and other features built into vehicles. Performance enhancements are expected to be long-term impacts, as commercial availability of these vehicles and the supporting electrified highways is not expected until after 2010. The impacts of highway electrification are also discussed in the DEIR for the Regional Mobility Plan (SCAG, 1988).

MITIGATION: Negative short-term impacts due to construction of electrified highway facilities can be mitigated with construction phasing, scheduling away from peak hour traffic, designation of appropriate detours, and increased transit alternatives and service during the construction period.

SECTION 4-13

PUBLIC SERVICES

Fire and Police Protection
Residential and Public Sectors
Schools
District Impacts

FIRE AND POLICE PROTECTION

Clean Fuel Retrofit of Transit Buses and Clean Fuels in New Fleet Vehicles

SETTING: These two measures would convert diesel and gasoline burning bus, truck, and auto engines to clean fuels, such as methanol, compressed natural gas, electricity, propane, and fuel cells. Transit agencies would be called upon to retrofit existing buses and to purchase new clean fuel buses, while fleet operators with 15 or more vehicles would be required to phase in clean fuel vehicles as existing gas and diesel vehicles are replaced.

IMPACT: The transport of alternative fuels into and within the Basin may require new kinds of fire response in the event of accidents or spills. Additional specially trained fire fighters may be needed to be prepared for the greater variety of potential upsets. Special fire fighting and protective equipment may be needed to handle the new fuels.

MITIGATION: Local jurisdictions and businesses will need to update their emergency response plans to handle the different risks presented by transportation and storage of methanol and other alternative fuels. Enforcement of proper handling, transit and storage techniques will also help mitigate the potential for upset for all alternative fuels.

Mode Shift Strategies

Parking Management and Auto Use Restrictions

SETTING: These measures both cause changes in the flow of traffic into and around busy job, event and retail centers. Parking management controls would restrict parking supply as a deterrent to auto trips, and shifts drivers to other modes of transit. Auto use restrictions would ban automobiles from congested centers at certain times, shifting passengers to transit and other alternative modes. Both measures would reduce emissions through the cut in vehicle trips and miles travelled.

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IMPACT: Additional police enforcement and traffic direction will be required to implement these measures. Parking management will require increased enforcement of street parking regulations to discourage long-term parking and stopping in restricted areas. Auto use restrictions will require increased traffic direction to direct motorists around and out of restricted areas. The need for more police enforcement of both measures will be most acute in the short-term as the public first encounters these requirements.

MITIGATION: Adequate public notice of the establishment of parking management and auto restriction zones, supplemented by clear, permanent public signing will help educate motorists to avoid these areas unless they qualify for access. This will relieve the need for additional police personnel to inform and direct motorists. Strong enforcement measures, including fines and towing, will emphasize the importance of parking and access restrictions and deter potential violators, which will minimize the number of officers needed for enforcement activities.

Control of Emissions from OCS Exploration, Development and Production

SETTING: This measure controls emissions of air pollutants generated during oil exploration as well as during development and production. These include diesel engine modifications, use of alternative fuels, inspection and maintenance programs and platform electrification.

IMPACT: OCS controls may result in increased solid or liquid hazardous wastes associated oil exploration, development or production, depending on the emission-reducing technologies employed.

MITIGATION: To mitigate the potential for hazardous waste emissions, proper handling, storage, and disposal methods should be observed.

RESIDENTIAL AND PUBLIC SECTORS

Out-of-Basin Transport of Biodegradable Solid Waste

SETTING: Demand for waste disposal will increase as a result of population growth accommodated by the AQMP. Out-of-Basin Transport of Solid Waste controls would eliminate solid waste decomposition in landfills as a source of emissions. Refuse conversion facilities would be sited adjacent to the Basins, where refuse would be recycled and separated, and the combustible solids used to generate electricity which would be returned to the Basin.

IMPACT: This measure would result in the establishment of waste transfer, recycling, and fuel conversion facilities outside the perimeter of the Basin, near rail and freeway access. It would therefore relieve pressure on Basin jurisdictions to provide land for new landfill capacity and other related waste disposal facilities.

Potential negative impacts include increased waste transfer traffic on streets, highways, and on rail corridors as the waste is hauled longer distances for disposal. In addition to increased congestion, this traffic also increases the potential for accidents and spills.

Jurisdictions adjacent to the Basin may resist siting new landfills and other waste disposal activities within their boundaries, thus pushing disposal facilities further from the Basin and exacerbating waste transport distances.

MITIGATION: Maximum reliance on rail transport of wastes can ease the impact on traffic safety and congestion. Reluctance to site disposal facilities in jurisdictions outside the Basin can be alleviated by advantageous facility financing and tipping fees that generate local revenues.

Control of Fugitive Emissions from Publicly Owned Treatment Works

SETTING: This measure would result in more stringent standards for industrial wastewater discharged to publicly owned treatment works, and would require add-on controls at the sewage plant to remove remaining sources of emissions. These actions would reduce ROG emissions.

IMPACT: Additional pretreatment by industrial wastewater dischargers would result in increased amounts of solid and liquid wastes requiring disposal at Class 1 landfills.

MITIGATION: Where possible, industries discharging industrial wastewater could alter processes to reduce the amounts of hazardous liquid and solid wastes generated.

OTHERS

Uniform Commercial Quality Standard on All Gaseous Fuels

SETTING: Petroleum refining and solid waste decomposition both generate fuel gases that contain relatively high amounts of sulfur. These "sour" gases would be "sweetened" using a variety of methods. Refineries may opt to use amine treatment to remove hydrogen sulfides, and the Merox process to eliminate mercaptans. Sewage treatment plants and refineries may employ the Stretford process or caustic scrubbing to remove hydrogen sulfide. Further, odor control methods for sewage plants include ferrous and ferric chloride injection to keep sulfur related odors at a minimum.

IMPACT: All of the above control methods would generate liquid or solid waste requiring proper landfilling or other methods of disposal. These include the used cleaning agents themselves or the precipitates and effluent they discharge.

MITIGATION: Proper handling, storage, and disposal methods should be observed in order to mitigate the potential for adverse impacts.

Lower Limits on Sulfur Content of Stationary Liquid Fuels

SETTING: This control measure is directed at reducing SO_x emissions from stationary sources by making available low-sulfur liquid fuels. New, more stringent standards for sulfur content of fuels would be put in place. Refiners would then select an appropriate technology for reducing the sulfur content, including hydrodesulfurization, fuel blending, and use of lower sulfur crudes.

IMPACT: All of the above methods of desulfurization have the potential to increase the amount of liquid and solid wastes requiring landfilling or other means of disposal and treatment. Some methods would produce more waste than others depending on the type and amount of catalytic or scrubbing agents.

MITIGATION: Implementation regulations can direct refineries to select the lowest waste generating desulfurization method available.

Agricultural Processes

Control of Emissions from Livestock Wastes

SETTING: Approximately 500,00 dairy animals produce emission-generating wastes in the region. This measure calls for alternative uses of livestock waste, alternative disposal methods, addition of water to compost piles, and better housekeeping practices.

IMPACT: Alternative disposal methods and better housekeeping practices would result in a larger volume of liquid and solid waste requiring treatment and disposal. The additional waste volume would further tax the dwindling capacity of landfills in the Basin.

MITIGATION: Maximum reuse of livestock waste for energy-generating purposes would reduce the amount requiring disposal.

Growth Management

SETTING: Growth management controls would seek jobs/housing balance at the subregional level. Local ordinances and plans would encourage a higher level of housing production in job-rich areas than would otherwise occur, while housing-rich areas would establish more job-generating land uses. The improved efficiency of the Basin's urban form would reduce the length and number of home-to-work trips, thereby reducing emissions due to peak-hour commuting. The Basin's total population would be the same as those expected according to trend.

IMPACT: Future population growth accommodated by the Plan will require new waste treatment and disposal resources. The growth management measure will alter the geographic distribution of wastes generated, but not the total amount. Increased residential wastes, over and above the levels that would occur under trend population growth, would be generated in the Basin's urban core area. Increased commercial and industrial wastes would be generated in urbanizing areas to a greater extent than would be predicted by trend. This may require some equipment and personnel adjustments by waste collection and hauling companies.

MITIGATION: Local jurisdictions can help insure the proper type and amount of waste disposal facilities and services by coordinating with collection agencies, and other jurisdictions that provide landfill capacity to site adequate new facilities near the growth in demand.

SCHOOLS

Growth Management

SETTING: Growth management controls would seek jobs/housing balance at the subregional level. Local ordinances and plans would encourage a higher level of housing production in job-rich areas than would otherwise occur, while housing-rich areas would establish more job-generating land uses. The improved efficiency of the Basin's urban form would reduce the length and number of home-to-work trips, thereby reducing emissions due to peak-hour commuting. The Basin's total population would be the same as those expected according to trend.

IMPACT: In the course of establishing jobs/housing balance, growth management controls would redistribute population growth in the region. Fewer new homes would be built than would otherwise occur in urbanizing areas. This would relieve the demand for new school facilities that has characterized these areas in recent years. However, more families would live in the urban core than would otherwise have occurred without growth management. Some urban areas have experienced declining school enrollments and some school closures recently. Intensification of population in urban areas would not only fill this current excess capacity, but would

require additional facilities to meet the demands of population growth. Provision of additional school facilities may be especially difficult in built-out urban areas where available land is scarce and expensive. Short-term overcrowding may result.

Jobs/housing balance measures may also redistribute the populations ethnicity characteristics. Since Hispanic families have markedly higher fertility rates, this could result in increased demand for schools even in areas with reduced housing growth. Ethnic redistribution could also change the number and location of schools that will require additional language programs to meet the needs of non-English speaking pupils.

The growth in school facilities and enrollment will require school districts to hire additional teachers, administrators, and support personnel, and to purchase new equipment and school transportation vehicles where public transit is not sufficient.

MITIGATION: Local jurisdictions and school districts can cooperate to plan in advance for anticipated enrollments and needed facilities. Additional state or local funding would ease the problem of land acquisition for new school sites in urban areas. Developer dedications and land donations as a condition of project approval can also help provide school sites in both urban and urbanizing areas.

DISTRICT IMPACTS

SETTING: Programs to research, develop, and enforce the various rules and regulations that will need to be promulgated. Monitoring of the various programs will also need to take place.

IMPACT: While many of the control measures included in the AQMP will help to streamline permitting processes by specifying a given set of control devices or tactics, the large number of programs needed to be established to ensure implementation of the AQMP will require additional personnel will be needed to process permits, research new control technologies, prepare rules, assess implementation strategies, and enforce compliance, among other activities.

MITIGATION: To the extent that more efficient use can be made of existing District personnel, a part of this impact be mitigated. Additional staff and equipment could be added to the District's budget to deal with the remaining workload increases.

SECTION 4-14

ENERGY

Energy Conservation

Industrial Energy Use

Transportation

Tier III Electrification

Alternative Fuels Program

Natural Gas Industry

Petroleum Industry

ENERGY

The Basin currently depends heavily on energy derived from combustion of fossil fuels in the Basin. Many control strategies contained in the AQMP focus on shifting away from the use of fossil fuels in Basin to less polluting forms of energy. Electrification, use of alternative fuels (e.g., liquid petroleum gas (LPG), compressed natural gas (CNG), and methanol), and energy conservation are the primary strategies proposed to reduce the use of fossil fuels and hence their emissions. Both the industrial sector and the transportation sector are expected to be affected.

ENERGY CONSERVATION

SETTING: Tier I energy conservation measures are intended to reduce the amount of energy required by the Basin's residents, commercial businesses, industries, and local governments. Local governments would be required to reduce their overall energy consumption 15 percent by the year 2000 and an additional 15 percent by the year 2010. In addition, changes in pricing, tax, and subsidy incentives would reduce residential and commercial energy consumption by 10 percent in the year 2000 and by 15 percent in 2010. Significant reductions in energy consumption could also be achieved by increasing the use of waste recycling.

IMPACT: Each of the energy conservation measures would reduce the amount of energy required in the Basin. This is a significant positive environmental impact because energy resources are used more efficiently. Also, the energy conserved is up for alternative uses and can help meet increasing future demand for energy.

INDUSTRIAL ENERGY USE

Electrification of Industrial Processes

SETTING: Electrification of industrial processes will increase the demand for electricity. Affected combustion processes include stationary internal combustion engines, boilers, and heaters.

IMPACT: To the extent that out-of-Basin power supplies are needed to meet increased in-Basin demand, Basin residents, businesses, and industries will be increasingly affected by out-of-Basin power and energy planning decisions.

MITIGATION: Load management and energy conservation measures can be used to help limit the amount of electricity required. However, these techniques will probably not be sufficient to allow the demand for electricity to be met by in-Basin resources.

Greater coordination between the Basin's electric utilities, local jurisdictions, and regulatory agencies will be required to ensure that additional generating capacity is added to permit timely implementation of the electrification strategy.

Solvents and Coatings

SETTING: Measures to control solvents and coatings call for reformulation of solvents, more efficient application techniques, and, to a certain extent, use of add-on controls.

IMPACT: Control equipment that may be required to reduce emissions could increase electricity use through installation of afterburners, fans, ventilation systems, and other controls which use electricity.

MITIGATION: Energy efficient afterburner design and waste heat recovery could decrease the demand for combustible fuels, thus decreasing both air pollutant emissions and the amount of energy consumed.

On a more macroscopic scale, load management techniques can help manage the existing energy supply more efficiently.

TRANSPORTATION: TIERS I AND II

SETTING: Major rail line haul routes into and inside the Basin are anticipated to be 90 percent electrified by 2007. Purchase of electric locomotives or retrofit of existing diesel electric locomotives for dual use would be required by Tier I measures. Installation of overhead or third rail lines would be necessary to provide power to the locomotives.

Electrification of portions of the urban mass transit system is also included among Tier I measures. Construction of a substantial amount of infrastructure (i.e., transmission lines and, perhaps, guideways) will be required to electrify the mass transit system.

Approximately 20 percent of the passenger vehicle fleet is anticipated to be electrified to achieve Tier II goals. Currently, prototype electric vehicles exist that run on the power stored in rechargeable lead-acid batteries. However, the range and acceleration of these vehicles are limited and their cost high, making it difficult to compete with vehicles with IC engines.

Electrification of ship berthing facilities has also been proposed in the AQMP. Instead of keeping the ships' engines running to provide electricity and power, they would be required to connect to shore side power supplied by public or municipal utilities.

IMPACT: Electrification of rail line haul routes and sections of the transit system would require a significant amount of electricity. Assuming a 100 percent electrification of rail line haul routes, 1095 GWh per year would be required to meet the electric energy demand with 540 MW capacity.

In addition, in-Basin electrification of rail line haul operations would have to be coordinated with out-of-Basin line haul operations. If out-of-Basin operations continue to use conventional diesel powered locomotives, extensive switching between locomotives would need to occur just outside the District's boundaries. Alternatively, hybrid diesel/electric vehicles could be used.

Electrification of portions of the urban mass transit system would also increase the demand for electricity. Assuming 30% electrification of transit lines, the electric energy and capacity required would be 47 GWh per year and 12 MW respectively. Furthermore, significant infrastructure (e.g., power

lines and electric pick-ups) would need to be built to implement this measure.

Electrification of 20 percent of the passenger vehicle fleet to meet Tier II goals will result in increased demand for electricity. In calculating the energy demand of this strategy, off-peak night-time recharging of vehicle batteries was assumed. If no VMT control measures are assumed, passenger vehicle electrification would require 27,000 gigawatt hours (GWh) per year with a corresponding capacity of 9,100 megawatts (MW), given an 18 percent basin-wide reserve margin (Appendix IV-B). To implement off-peak recharging of batteries, a peak/off-peak rate structure and metering system will need to be established for the residential sector to encourage night-time charging of vehicles.

MITIGATION: Railroads have the potential to avoid peak hour electricity demand by scheduling trips off-peak. Although this will not decrease the overall railroad demand for electricity, it will make more efficient use of existing power plants.

Continued advances in power storage technology, such as super conducting magnetic energy storage (SMES), will help reduce the peak hour electricity demand.

The development of methanol/fuel cell electric vehicles could reduce the dependence of vehicles on batteries and cut night-time peak demand. Also, to the extent that other control measures promote less driving, less energy will be required overall.

ALTERNATIVE FUELS PROGRAM

SETTING: Many industrial boilers or turbines could be converted to use alternative fuels rather than fossil fuels. These fuels include natural gas and methanol. As liquid and solid fuels are phased out, use of methanol is encouraged as a BACT alternative.

The transportation sector contributes significantly to the air pollution problem through the use of internal combustion engines. In order to reduce the emissions from fuel combustion in the transportation sector, Tier I and Tier II control measures focus on substituting cleaner, less-polluting forms of

power for those sources currently fueled by gasoline or diesel fuels. Alternative fuels for transportation include not only methanol, but compressed natural gas (CNG), and liquified petroleum gas (LPG). By the year 2000, 20 percent of all new fleet vehicles are expected to be powered by electricity. The remainder of the passenger vehicle fleet would run on alternative fuels with emissions at least as low as those of methanol.

In addition, transit buses will be required to install retrofit equipment to enable them to use clean fuels. By 2007, 70 percent of the urban transit bus system is expected to be powered by alternative fuels, with the remaining 30 percent to be electrified. By the year 2007, heavy-duty trucks would also run on alternative fuels.

IMPACT: The shift away from gasoline and diesel fuels will decrease the demand for these petroleum products while increasing the demand for alternative fuels and electricity within the Basin. Widespread demand for alternative fuels within the Basin would necessitate that the current fuel production, distribution, and storage infrastructure be adapted to provide alternative fuels.

MITIGATION: The degree to which the current fuel distribution system would need to be adapted depends on the type of fuel ultimately used. Increased industrial use of natural gas does not require mitigation because, in most part, the distribution system already exists. However, increased use of natural gas to power vehicles would require special fuel tanks and the different handling techniques. Increased consumer education and awareness, such as was seen in the use of vapor recovery units at fueling stations, would help mitigate impacts associated with the changeover to alternative fuels.

Methanol

SETTING: Methanol is cleaner burning than diesel fuel, gasoline, or fuel oil. The District has endorsed methanol as an alternative fuel.

IMPACTS: Methanol, in particular, has specific environmental and health impacts associated with its use, as noted in the sections on public health. Because methanol has approximately half the energy content per given volume that either gasoline or diesel fuel has, methanol fuel production would have to increase significantly to provide twice as much volume of fuel as would be required of gasoline.

In the near-term, methanol produced from natural gas could be competitive with fossil fuels (CCEEB, 1987). Potential sources of supply include Canada, Mexico, Malaysia, New Zealand, and South America, all of which have or are constructing methanol production facilities using unconventional natural gas supplies (gas that is not economically marketable via pipeline). Methanol would also be economically competitive if the price of crude oil were to double.

In the long-term, methanol could be economically competitive with fossil fuels if it received the same tax advantages and government assistance as those currently granted to oil production. This unequal tax treatment undermines methanol's economic competitiveness (CCEEB, 1987).

MITIGATION: As methanol use in the South Coast Air Basin (Basin) increases, rail tank car delivery could be augmented or replaced by vessel and barge deliveries. If the sales volume of methanol increased substantially, methanol might then be delivered by pipeline. Pipelines, because of their substantial economies of scale, can be a very inexpensive means of transporting large quantities long distances (D'Eliscu, 1987). In addition, spills or leaks from a pipeline would have less of a detrimental environmental effect than oil spills from tankers. The rapid disposal, dilution, evaporation, and biological degradation of methanol in both aquatic and terrestrial habitats minimize its impact on living systems. Soil penetration and aquifer involvements are minimal concerns with methanol production (D'Eliscu, 1987).

Natural Gas

SETTING: Natural gas is a clean alternative fuel that can be used by industrial sources. Compressed natural gas (CNG) and liquified natural gas (LNG) could be used as transportation fuels.

IMPACT: Because natural gas is both a feedstock to produce methanol and an alternative fuel in its own right, increased demand for natural gas may affect the natural gas supply. Both CNG and LNG are different from liquid fuels such as gasoline and methanol because the temperature at which they vaporize is lower. CNG vehicles would require larger tank capacity, or more frequent fill-ups than gasoline-powered vehicles. LNG vehicles would require special cryogenic fuel storage systems to maintain the liquid state of

the fuel. For both LNG and CNG, the fuel tanks would need to be vented if the vehicle were not used for a significant length of time.

MITIGATION: Improvements in natural gas distribution and storage techniques, along with increased consumer education and awareness of the differences in dispensing gaseous fuels instead of liquid fuels, can help mitigate some of the impacts of natural gas fuels.

ELECTRIFICATION: TIER III

Tier III measures go beyond the controls proposed in Tiers I and II. It is unclear exactly what these measures will comprise and the manner in which they would be implemented.

SETTING: In Tier III, 100 percent of the passenger vehicles are expected to be powered by electricity or the emission reduction equivalent. Battery powered vehicles appear to have the greatest potential for implementation over the next 20 years, as prototype vehicles now come into production. However, electrification of highways is also a future scenario which may be considered.

IMPACT: The energy demand to electrify passenger vehicles will be significant. Although battery technology appears most likely to be used at this point, the batteries will require recharging. In the event that highway electrification would become a proven technology, even greater energy supplies would be required to implement widespread electrification. The electrical demand for battery charging would, however, be reduced if highways were electrified. Extensive infrastructure would have to be built to electrify highways.

Although a significant portion of this energy demand could be met from in-Basin supply through load management techniques and generation of electricity by non-polluting sources such as fuel cells, photovoltaic cells and wind power, the remainder of the demand would have to be met by electricity generated outside the Basin.

MITIGATION: Off-peak charging of batteries could significantly reduce the peak load capacity that would be required for vehicle electrification. Continuation of Tier I and II transportation control measures which reduce

the number of vehicle trips made and the vehicle miles traveled could also help mitigate the impact on the energy demand. Also, improvements in electrical vehicle performance could also reduce the energy demand.

NATURAL GAS INDUSTRY

SETTING: Despite continued population growth in the Basin, demand for natural gas for residential and commercial uses is expected to remain constant over the next twenty years because of increased energy efficiency of appliances and processes. Yet, to the extent that industrial processes are not electrified, additional natural gas will be required. Also, natural gas is used as a primary feedstock to manufacture methanol outside the Basin.

IMPACT: Natural gas is likely to be used extensively in industrial processes as an alternative fuel because the distribution infrastructure is already largely in place. Increased use of natural gas in this sector will decrease the natural gas supplies more quickly than if both natural gas and fuel oil were used. However, significant reductions in ROG emissions are expected to result.

As increasing amounts of methanol are required to fuel both vehicles and industrial processes, greater amounts of natural gas and other feedstocks for methanol production will be required. Also, increased methanol use by motor vehicles and stationary sources could deplete natural gas supplies at a faster rate than would otherwise occur with conventional fuel use because of energy losses inherent in the fuel conversion processes which transform natural gas into methanol. Increased demand for methanol could also increase the demand for coal, resulting in mining, transport, and processing impacts outside the Basin. The exact magnitude of these impacts will depend upon market forces. (For a more detailed discussion on methanol, see Appendix IV-E.)

If compressed natural gas (CNG) and liquified natural gas (LNG) are used as alternative fuels in the transportation sector, the demand for natural gas can be expected to increase further.

MITIGATION: Increased efficiency of industrial processes can help mitigate some of the impacts from increased demand for natural gas. For the transportation sector, measures developed to decrease vehicle emissions by

reducing travel distance and frequency will also help decrease the demand for natural gas because less energy will be required.

PETROLEUM INDUSTRY

SETTING: Measures contained in the AQMP would require that electrical power or alternative fuels be substituted for industrial fossil fuel combustion processes as well as in the transportation sector. The amount of fuel which would need to be substituted is substantial: Industrial and utility use of distillate and residual fuels in the Basin totaled 166 trillion Btu in 1987. Basin motor gasoline consumption was 1505 trillion Btu in 1987. Consumption of distillate and residual fuel in the Basin's transportation sector was 856 trillion Btu in 1987.

IMPACT: An estimated 10% of distillate and residual fuel sales would remain, due to emergency generator needs.

Although in-Basin use of petroleum fuels would be eliminated, it is possible that refineries could continue to process fuel in the Basin if non-polluting refinery processes could be developed.

MITIGATION: If petroleum distillation were to continue, fuels refined here could be transported by tanker or pipeline and sold outside the Basin. To the extent that Basin consumption represent imports from outside the Basin, this out-of-Basin production could be diverted to other markets.

SECTION 4-15

UTILITIES

Electric Utilities

Natural Gas Utilities

ELECTRIC UTILITIES

SETTING: The AQMP's electrification strategy will require substituting electric power for combustion processes in the industrial and transportation sectors. Table 4-15.1 provides estimates of the electric energy (in gigawatt-hours per year, GWh/yr) and the generating plant capacity (in megawatts, MW) needed for implementation of the AQMP's Tier III measures.

TABLE 4-15.1
ELECTRIC ENERGY AND CAPACITY REQUIREMENTS FOR TIER III *

Industrial electrification	4400GWh/yr	1500 MW
100% electrification of passenger vehicles	135,000 GWh/yr	(45,500 MW)
100% electrification of rail haul lines	1,098 GWh/yr	540 MW
50% electrification of urban mass transit system	78 GWh/yr	20 MW
TOTAL	140,576 GWh/yr	(46,060 MW)

(Parentheses indicate nighttime vehicle charging)

* 18% reserve margin assumed throughout.

In addition, complete electrification of ship berthing facilities will also require electric energy and capacity. If highway electrification is implemented, an additional amount of electric energy and capacity will be needed.

Tier II passenger vehicle electrification would reach approximately 20% of the fleet. This would consume 27,000 GWh/yr of electric power and require 9,100 MW of generating capacity. Partial achievement of the Tier III electrification strategy is expected to occur extent during implementation of Tier II.

IMPACT: The AQMP electrification strategy for the industrial and transportation sectors will require that the Basin's electric utilities supply an additional 136,176 GWh/yr of electric power and provide 46,060 MW of additional generating capacity by the year 2007. These requirements are over and above those that the electric utilities will have to meet to supply population and economic growth in this period.

Although a fraction of the additional power-generating capacity can be met in-Basin, emission limits on fossil-fueled power generation, coupled with offset requirements under the District's New Source Review rule, will limit siting of these plants in-Basin. Non-polluting generating plants which can be sited in-Basin include wind power, solar energy, and fuel cells. Table 4-15.2 indicates the capacity additions expected from these and other generation resources.

Therefore, the bulk of the additional generating capacity and electricity required to implement the electrification strategy is expected to come from sources outside the Basin. Although some of these out-of-Basin generating plants are owned by Basin electric utilities, the remainder are owned by other utilities from which Basin utilities purchase power and capacity, either under contracts or on the spot market. Expansion of out-of-Basin electricity supply to meet Basin electrification needs may be undertaken by utilities located both in and outside the Basin. The timing of these generating plant additions may affect the rate at which implementation of the electrification strategy can proceed.

Actions by regulatory authorities also affect the rate of generating capacity expansion, sales of power between utilities, and the expansion of the power transmission system. In California, the Public Utilities Commission and the California Energy Commission regulate these activities. Since a portion of the needed electricity supply is expected to come from out of state, regulatory agencies in those states will be involved. The decisions by these agencies in other states to permit new power plants intended to serve Basin needs may affect needed supply additions.

The largest out-of-state source of power and capacity purchases by Basin utilities is from the Bonneville Power Administration (BPA), in the Pacific northwest. BPA power is primarily hydro-electric, with a smaller share from thermal generating plants. Hence, the supply of this power to the Basin depends upon rainfall conditions in the Pacific northwest. The California Energy Commission conservatively estimates that 13,150 GWh can be

supplied indefinitely by BPA to California (including non-Basin purchasers). This represents only about 9% of the additional supply needed in the electrification strategy. (CEC, 1986 Electricity Report). BPA estimates that at least 2000 MW will be available to California through the year 2005 (CEC, 1986 Electricity Report). This represents only about 4% of the capacity needs of the electrification strategy.

Another major source of out-of-state power is the southwest. Presently, half of the Basin's power imports from the southwest are from plants owned by Basin utilities, the remainder being purchases from out-of-Basin utilities. As the population and economy of the southwest grow, sales to Basin utilities can be expected to decline.

The fraction of power and capacity available from BPA and southwest sources suggests that construction of large amounts of out-of-Basin generating and transmission capacity will be needed in order to implement the electrification strategy. These new power plants will require substantial commitments of financial resources, labor, and fuel by utilities, both in and outside the Basin. These expenditures, in turn, may be reflected in rate increases, subject to PUC approval.

MITIGATION: There are three main groups of measures which can mitigate the impacts of out-of-Basin power plant and transmission line construction: conservation measures, load management measures, and alternate sources of supply.

Conservation Measures

Approximately twenty percent of the electrification strategy's power and capacity needs, or 28,130 GWh/yr and 9080 MW, could be offset by energy conservation measures. Three-quarters of this amount would result from local government energy conservation programs, waste recycling, and incentives such as pricing, taxes, and subsidies included as control measures in the Plan (AQMP Appendix IV-G). The remaining 25% would come from other efforts, including those of utilities.

The largest amount of conservation--equaling 40% of the additional supply needed-- would come from traffic conservation measures which reduce VMT of electric vehicles. This is a savings of 56,260 GWh/yr

and 18,160 MW. This figure represents current technology and is likely to be reduced substantially as electric vehicle performance improves.

Load Management Measures

Load management programs shift the use of electricity from peak-use hours to non-peak hours, making electricity demand more even throughout the 24 hours of the day. Thus, electric generating capacity, which must be consumed instantaneously, can be utilized more fully and peak usage can be reduced. Reduction in peak usage means that additional generating capacity does not have to be built to meet this peak. Although there is a reduced need for capacity, energy needs are unchanged when peak usage is shifted to another time of the day.

The major opportunity for avoiding generating capacity additions through load management is with electric vehicle charging. To the extent that vehicle charging can be shifted to nights or other off-peak periods, the demand for power is evened out. Passenger vehicles offer the greatest potential for off-peak charging. Electrified transit, which does not utilize batteries, cannot shift use off-peak. A certain percentage of the commercial vehicle fleet using batteries may require on-peak charging due to limited vehicle range and necessary trip lengths.

Electricity storage is a technology-based load management alternative. Presently, electricity must either be consumed as soon as it is generated, or stored by inefficient means, such as pumped water storage. The developing technology of superconducting magnetic energy storage (SMES) offers an efficient and relatively inexpensive storage medium. SMES stores current in a magnetic field produced by superconducting coils. The technology is expected to be available to utilities by the year 2000 (AQMP, Appendix IV-B). SMES would enable power produced or purchased to be utilized at various times of the day, allowing a better hourly match between generation and consumption. Thus the large capacity additions required by the electrification strategy could be mitigated somewhat. Estimation of the extent of this mitigation would at this point be speculative. Although storage of electricity would even out usage total, electric energy needs would remain unchanged.

Utility load management programs can also reduce significantly the need for generating capacity additions. These programs include thermal energy storage, equipment purchase incentives, and reduction of peak use through conservation.

Alternate Supply Sources

Transmission

The electric power generating industry is being increasingly deregulated. As a result, independent power producers are expected to provide an increasing share of future electric energy and capacity. To the extent that this trend continues, utility expansion programs could be scaled down.

SETTING: Transmitting and distributing the significantly greater quantities of electricity called for in the electrification strategy exceeds the design capacity of existing transmission lines.

IMPACT: Significant electrification of the industrial and transportation sectors will require extensive construction and upgrading of transmission lines and switching facilities, both within and outside the Basin. Since the increase in power consumption will be significant and widespread, additional transmission lines will need to be constructed. It is expected that some of these transmission lines will need to be constructed in areas where they currently do not exist.

Transmission line, substation, and switching facility construction removes land from other uses. However, land under transmission lines can sometimes be used for low-intensity uses such as agriculture or storage.

There may be a possibility of human health effects from electrical and magnetic fields created by high voltages in the transmission lines. This impact would intensify with the increased voltages and greater numbers of transmission lines needed.

MITIGATION: Load management measures, which even out the demand for electricity over the day, make more efficient use of transmission lines as well as generating plants. To the extent that new electricity demands, such as vehicle charging, can be shifted to off-peak times, the capacity of existing transmission lines is not exceeded, and new ones do not need to be built.

Storage and Metering

SETTING: New methods of electricity storage would also allow more efficient use of existing transmission capacity by allowing electricity generated out of Basin to be transmitted during off-peak hours and stored in the basin. With current and foreseeable technology, electric vehicles which use batteries must be charged daily for a period of hours in order to provide maximum range in use.

IMPACT: Daily charging of the Basin's vehicle fleet is expected to produce congestion problems, which in some locations may be severe. Since the electric vehicle must be connected to a source of power for a charging period of several hours, a means must be found to bring the vehicle to an electrical outlet, or vice versa. Daytime charging of business vehicles may remove space that could be better utilized. Nighttime charging of personal passenger vehicles could create congestion in areas of multi-family housing.

Metering devices to correctly bill users for the electricity used in vehicles charging would also have to be installed.

MITIGATION: New residential and commercial construction could be designed with charging needs in mind. For example, new multi-family dwelling complexes could have a lockable electrical outlet at each parking space, connected to the tenant's electrical meter. Commercial and public parking garages could have similar systems, with the cost of electricity used added to the parking fee.

Mobility

SETTING: By the year 2010, 100% of passenger vehicles and light- and medium-duty trucks would be powered by electricity or the emission-reduction equivalent.

IMPACT: Currently, the range and power of electric vehicles is limited, making longer trips outside the Basin more difficult. Out-of-Basin trips would be made more difficult for Basin residents, since their electric vehicles would have to find appropriate electrical charging outlets. Hence, mobility would be restricted. This could lead to ownership of an additional vehicle for use outside the Basin. Additions to the vehicle fleet in this manner may be expensive.

Travelers to the Basin using conventionally-fueled vehicles would cause vehicular emissions if in-Basin driving were allowed. If in-Basin driving were prohibited, traveler mobility would be hampered.

MITIGATION: In order to meet the mobility needs of Basin residents for long trips outside the Basin, the private market is expected to respond with a greater array of rental/lease arrangements and vehicles. Similar markets already exist for the rental of recreational vehicles. Markets are also expected to develop for the rental/lease of electric vehicles for travelers to the Basin. Increased monitoring of incoming conventional vehicles at the Basin border would be needed.

Alternatively, dual electric/conventional vehicles could be developed, though the added weight might reduce efficiency. To the extent that the nationwide vehicle fleet adapts to use a variety of liquid fuels, including methanol, travelers could utilize the methanol-burning capability of their vehicles while in the Basin.

Supply Reliability

SETTING: Out-of-Basin supply will be relied upon for most of the electric power and capacity needed in the electrification strategy. Coal-fired plants appear to be the generation type that will fill this need.

IMPACT: Transmitting the majority of the Basin's power over long-distance transmission lines increases the vulnerability of disruption of the power supply. Natural disasters, equipment malfunction, and human error can cause breakdown of the transmission system, sometimes for prolonged periods. Though alternate, more roundabout transmission lines can be called into service, their capacity may not be sufficient to meet power requirements, especially during peak hours.

Reliance on one type of generation resource, e.g., nuclear, coal, hydro, can also reduce the flexibility of the system to deliver power and can increase its vulnerability to disruption. For example, large baseload coal plants require a number of hours to start up and hydro resources depend on rainfall conditions. Fuel shortages caused by coal mine strikes or oil embargoes can remove an entire type of generation from operation. The California Energy Commission recommends that no more than one-third of generation resources be of the same type. (AQMP Appendix IV-B)

The vulnerability of the electric supply system, coupled with the degree of electrification anticipated, will make the effects of power outages more serious than they are today. Since the industrial and transportation sectors will be totally dependent on electricity for their energy needs, power outages will bring industry to a standstill and limit mobility significantly. For example, if nighttime vehicle charging is widespread and a prolonged power outage occurs overnight, electric vehicles may not be able to operate the following day. Emergency response to natural disasters would also be hampered by reliance on electrification if power outages occurred.

MITIGATION: One mitigation measure is to site superconducting magnetic energy storage (SMES) facilities in-Basin, so that in the event of a transmission breakdown, a local supply would be readily available. Use of conventional backup generators for emergency needs could continue, but with methanol or other clean fuels, so as not to reduce Basin air quality. Similarly, emergency response vehicles could also be fueled with methanol.

Over-reliance on a particular generation type can be mitigated by proper resource planning, including purchase of power and capacity from non-Basin utilities and from independent power producers.

Out-of-Basin Impacts

SETTING: The electrification strategy will increase the Basin's share of electricity consumption in the state and region. Out-of-Basin supply is projected to account for 6600 to 9800 additional MW of capacity of 16 to 22% of total Basin supply.

IMPACT: The disproportionate consumption of out-of-Basin electricity supplies by the Basin raises equity concerns. Regions outside the Basin may wish to keep these power resources for their own needs and for their future development. Power generation can make significant demands on regional natural resources such as fuels, water, and land. Construction and operation of power plants, while stimulating out-of-basin economies, may also produce problems, such as a "boom-bust" pattern of construction activities. Air quality in the vicinity of the power plants may be significantly reduced if fossil-fueled generating plants are used.

SECTION 4-16

RECREATION

Impacts on Recreation

RECREATION

SETTING: The control measures described in the AQMP are expected to alter current land uses and increase construction on undeveloped land. With AQMP implementation, recreational activity facilities such as parks, golf courses, amusement parks, beach areas and fairgrounds may be affected.

IMPACT: The implementation of the AQMP may infringe upon existing recreational structures, curb the development of new facilities and have a greater reduction in urban open space.

MITIGATION: The provisions of recreation is a local, state and federal function which proposes, plans and acquires recreational sites. Considerations by these entities should be made in balancing urban areas with open space for recreational facilities as well as preservation of existing facilities.

SECTION 4-17

HUMAN HEALTH

Introduction

Solvents and Coatings

Municipal Solid Waste

Stationary and Mobile Internal Combustion Engines

Oil Processing and Petroleum Distribution

Cross Media Effects

Electrification

Transportation Management Measures

Alternative Fuels Program

Selective Catalytic Reduction

HUMAN HEALTH

Improvements in Air Quality

SETTING: The primary purpose of the AQMP is to attain criteria air pollutant standards that have been set to protect public health.

IMPACTS: Significant improvements in human health can be expected by attainment of the air quality standards. These improvements in health are broad in scope and are a function of the specific pollutant. In general, reduced ambient air concentrations of criteria pollutants will increase respiratory function, reduce eye irritation, improve athletic performance and reduce susceptibility to disease.

Ozone

Reduced atmospheric ozone concentrations will increase breathing capacity. Furthermore, lung tissue damage caused by ozone could be expected to decrease substantially. Improved immune system function may also occur. Individuals particularly sensitive to the effects of ozone (e.g., persons with respiratory allergies, chronic bronchitis, or asthma) will benefit significantly from reductions in atmospheric ozone (Linn, 1988).

Oxides of Nitrogen

Reduced ambient air concentrations of nitrogen dioxide will decrease lung tissue damage as well as benefit other organs such as the spleen and lymph nodes. In addition, reduced NO₂ emissions may reduce the risk of lung cancer. Improvements in breathing capacity and reduced respiratory disease are also anticipated (ARB, 1983).

Particulate Matter

As a result of the AQMP, particulate matter will decrease significantly. Significant improvements in the lung function of both children and adults can be expected. In addition, reductions in respiratory symptoms and illness are expected (ARB, 1983).

Carbon Monoxide

Reduced ambient air concentrations of carbon monoxide will significantly benefit people with coronary heart disease by increasing the amount of oxygen-carrying protein contained in their blood. In the general population, decreased fatigue, improved reflexes, and fewer headaches could be expected (ARB, 1983).

MITIGATION: No mitigation measures are required.

Non-criteria Air Pollutants

A primary human health concern is the potential air quality impact from toxic air contaminant emissions. Current District efforts to control toxic air contaminants focus on those compounds that have been identified as toxic under Title 17, California Administrative Code, Section 93000, (California Assembly Bill 1807) and those listed by the U.S. Environmental Protection Agency as human carcinogens (Category A) or probable human carcinogens (Categories B1 and B2).

SETTING: The impacts of the proposed control measures and strategies in the AQMP vary depending upon the individual control measure or strategy. Moreover, the magnitude of these impacts may, in some cases, depend upon how the majority of operations in an industry choose to comply with specific control measures proposed for that industry.

The potential health effects due to toxic air contaminants are evaluated using a different approach than that used for criteria pollutants. The District's current approach and the approach developed for proposed air toxics rulemaking utilize risk assessment coupled with a best available control technology requirement.

Although ambient concentrations of toxic air contaminants on a regional basis are of concern, especially for benzene and hexavalent chromium, the assessment of impacts for these and other toxic compounds is typically evaluated on a local basis for a given individual source. Point-source modeling and emission data from a specific release point are utilized instead of regional sampling, emission inventory data-bases, and regional modeling. A given source of any type would have a variable impact depending on its emission characteristics and the makeup of the local community.

An additional factor affecting the determination of toxic air contaminant impacts from criteria pollutant control measures is the status of any compound's toxicity. There are a number of compounds that raise this concern because of their prevalent use or significant potential for being emitted, but it is not clear at this time whether they will be regulated as toxic air pollutants. Because of the significant potential impact from emissions of some compounds whose status is in question, the potential impacts from these compounds are also summarized in the following sections.

IMPACT: Table 4-17.1 summarizes the potential impacts of the 1988 AQMP Revision on emissions, and hence ambient concentrations, of some of the major toxic air contaminants found within the Basin.

TABLE 4-17.1
Potential Impacts from Emissions of Toxics

Category	Air Toxic ^a	Potential Impacts ^b
Solvents & coatings (includes wastes)	Various halogenated solvents: e.g. methylene chloride, TCE	Positive, potentially adverse, or no impact: dependent upon strategy or control measure
Municipal solid waste	Various: vinyl chloride, TCE, benzene, chloroform	Positive with waste reduction
Mobile source controls	Benzene from gasoline, EDB, EDC, Pb	Positive
Petroleum processing & distributing	Benzene	Positive
Cross media	Various solvents: TCE, methylene chloride	Positive
Electrification	Benzene EDB, EDC, Pb from IC engines	Positive
Transportation management	Benzene EDB, EDC, Pb	Positive
Alternative fuels	Benzene, formaldehyde, EDB, EDC, Pb	Positive for benzene, and for others; potentially adverse for formaldehyde
SCR	Ammonia	Mixed

^a TCE = 1,1,1-trichloroethylene, EDB = ethylene dibromide, EDC = ethylene dichloride, Pb = lead.

^b A positive impact means reduced emissions of toxics and adverse impact means increased emissions.

SOLVENTS AND COATINGS

SETTING: Depending upon the nature of the specific AQMP control measure or strategy, the impact on air quality due to emissions of toxic air contaminants from solvent use and coating applications could be positive, potentially adverse, or not significant.

IMPACT: The emissions of concern are those from solvent evaporation and from curing of coatings. There are four basic approaches to reduce ROG emissions from solvent use applications: (1) substitution of solvent-based methods with nonsolvent based methods (positive impact or not significant with respect to air quality); (2) modification of operations so that less solvent-based cleaning is required (positive impact or not significant); (3) add-on or improvement of control devices for capturing emissions of solvent (positive impact or not significant); and (4) substitution of ROG solvent-based formulations with lower vapor-pressure and nonreactive halogenated (exempt) solvent mixtures (not significant or potentially adverse).

Coating emissions will be controlled through five similar approaches: (1) conversion to solventless coating systems (positive impact or not significant); (2) improvement of transfer efficiency so that less solvent-based paint is used (positive impact or not significant); (3) switching to high-solids and/or water-borne coatings (positive impact or not significant); (4) utilizing add-on control equipment (positive impact or not significant); and (5) substituting nonreactive (exempt) solvents for ROG solvents in coating formulations (not significant or potentially adverse).

Control measures or strategies that emphasize or allow for replacement of solvent-based coatings with solventless coating technologies have the greatest potential for a reduction in both ROG emissions and toxic emissions. These technologies also have potential to decrease emissions because, in many cases, solvent-based cleanup is minimized or eliminated.

Measures emphasizing reduced solvent use or increased capture of evaporated solvent also have significant potential to decrease toxic air contaminant emissions as a result of reformulation, positively affecting air quality and human health. Evaporative toxic emissions from solvent wastes will also be reduced because less of this waste will be generated.

Specific short-range control measures and the long-range strategy for this source category are important because they emphasize, or will allow for, reformulation with exempt solvents. Because some of the compounds which could be used as substitutes may be potentially toxic yet not yet identified as toxic by the ARB and Department of Health Services, reformulation to control ROG emissions from solvents and coating may have an adverse impact on toxic air quality and thus human health.

The extent of exempt solvent emissions could vary depending on the amount of substitution, associated process changes and on in-plant solvent reuse and recovery programs. Moreover, if a solvent is found to be particularly hazardous, industries may choose to restrict the use of the compound for the protection of their workers health and to limit potential liabilities from use of the compound.

Two compounds likely to be used as substitutes in coatings and surface cleaning solvent formulations respectively are 1,1,1-trichloroethane (also known as methyl chloroform, MC, or TCA) and methylene chloride. Additional compounds which are used in some solvent formulations and also could be used for coatings include various fluorocarbons, and chlorofluorocarbons. For dip tank cleaning of parts, exempt solvents that may be used as substitutes include perchloroethylene, 1,1,1-trichloroethane, methylene chloride, trichloroethylene, and various fluorocarbons. The major compounds of concern, in terms of emission potential, are summarized in the following paragraphs.

Methyl chloroform, or 1,1,1-trichloroethane, is not currently classified as a toxic air contaminant under the Tanner process and has not yet been scheduled for review under the process. Because a significant amount of the compound is used in California, it is in the California Air Resources Board category three -- a compound to be considered for review. To date, EPA has not found sufficient evidence to regulate this compound as a hazardous air pollutant. EPA is currently evaluating a recently completed study on the compound's carcinogenicity to determine if the results are valid. According to EPA's Office of Air Quality Planning and Standards, if methyl chloroform is an animal carcinogen, it is a weak one.

Methylene chloride is currently considered a probable human carcinogen by EPA and is undergoing review for consideration as a toxic air contaminant under the Tanner process (AB 1807). The District has also listed this compound under proposed Rule 1401 (New Source Review for Air Toxics).

Methylene chloride is used extensively in paint stripper formulations and can also be used for metal parts degreasing. Substituting methylene chloride for photochemically reactive solvents have potential for producing an adverse air quality impact.

Perchloroethylene is currently being evaluated by EPA with regard to its carcinogenicity and also for its potential to contribute to the formation of ozone (reactivity). Under the Tanner process, perchloroethylene is one of the compounds already in the review process for determination of its status as a toxic air contaminant. Substituting perchloroethylene for reactive solvent based cleaning may have the potential for producing an adverse air quality impact.

MITIGATION: Mitigation measures for processes and operations switching from reactive solvents to exempt solvents are possible in cases where the substituted solvent is a carcinogen. Proposed Rules 223 and 1401, although they are not a part of the AQMP Revision, would help mitigate adverse impacts due to increased emissions of toxics.

Current state and local agency policies (and proposed rules) with regard to emission of toxic air pollutants are risk based and some operations may require reductions in these emissions. For these operations, the addition of add-on control devices would be required by proposed District rules. Add-on control would be an effective measure to reduce emissions of toxic compounds to a level of no significance. Proposed District rules would insure against air toxic impacts from industrial and manufacturing operations. A procedure to require mitigation of significant emissions of toxic air pollutants thus already exists and can be refined in the future.

Municipal and Solid Waste

SETTING: The control measures for this category both implement waste reduction programs and transport solid waste to disposal sites outside of the South Coast Air Basin.

IMPACT: These measures will reduce emissions of toxic air contaminants (e.g., vinyl chloride) and ROG from landfills, and the emission of toxic air contaminants due to incineration of municipal solid waste in the Basin.

Although these emissions would no longer increase in the Basin, emissions from existing waste disposal sites would continue, and the emissions from new wastes generated would occur at a different location. The significance of increased toxic emissions outside the Basin would depend on the area in which the wastes were disposed. These measures will reduce emissions of toxic air contaminants (e.g., vinyl chloride) and ROG from landfills, and the emission of toxic air contaminants due to incineration of municipal solid waste in the Basin.

Thus any risks presented by wastes generated in the Basin would be transferred outside the Basin's boundaries. Also, to the extent that vehicles transporting the wastes to central collection points do not use clean fuels and rail lines transporting the wastes out-of-Basin are not electrified, increased travel and the accompanying emissions will result. If municipal waste is transported out of the Basin by ship, the potential for toxic emissions into the water may also result.

MITIGATION: Efforts can be made to reduce the amount of wastes generated by encouraging recycling and less waste-producing processes. Use of clean fuels or electricity to power vehicles transporting the wastes outside the Basin would mitigate the impacts of increased transportation emissions. Proper handling and storage of wastes can also help reduce the potential for any adverse impacts.

Mobile Source and Stationary Internal Combustion Engines

SETTING: Control strategies for this source category include improved combustion efficiency and evaporative controls on vehicles and other mobile sources, volatility requirements for fuels, and particulate controls for diesel engines.

IMPACT: This group of controls will have a positive air quality impact with regard to toxic air contaminants due to decreased emissions of toxics from gasoline powered sources. Improved combustion and evaporative controls will decrease emissions of benzene, and other compounds such as ethylene dibromide and ethylene dichloride. Benzene is a known human carcinogen. Ethylene dibromide and ethylene dichloride are considered probable human carcinogens by EPA (Category B). All three of these compounds have been identified as toxic air contaminants under the Tanner process and listed for

regulation under proposed District Rule 1401. Decreases in toxic air emissions will in turn positively affect human health.

Control of particulate from diesel engines will have a positive impact due to reduced emissions of toxic compounds (metals and polyaromatic hydrocarbons) associated with the PM10 fraction of diesel engine particulate emissions.

MITIGATION: No mitigation measures are necessary.

Oil Processing and Petroleum Distribution

SETTING: This group of measures includes controls that limit emissions from valves, pumps, and distribution points.

IMPACT: Controls on fugitive hydrocarbon emissions from oil development, oil processing, and petroleum product transport and distribution will have a positive impact on ambient concentrations of benzene.

MITIGATION: No mitigation measures are necessary.

Cross Media

SETTING: This category includes controls on soil decontamination, air stripping, publicly owned treatment works (POTWs), and refinery sumps, pits and wastewater separators. Some of these controls have recently been adopted into District Regulations and others proposed for adoption.

IMPACT: Controls on these sources have a positive impact on toxics air quality because of decreased emissions of toxic compounds.

MITIGATION: No mitigation measures are necessary.

Electrification

SETTING: This category includes a variety of control measures aimed at reducing emissions of NO_x and other pollutants from mobile sources, stationary IC engines, and miscellaneous industrial/manufacturing operations. Electric vehicles would be introduced to replace gasoline

powered vehicles. The goal for stationary sources is to replace fossil-fuel powered units with the equivalent electric powered units. New sources would be forced to electrify because they would not be granted permits to operate.

IMPACT: Replacement of stationary diesel engines with electric units would have a positive impact due to reduction of diesel particulate emissions.

Replacement of gasoline powered vehicles with electric vehicles would have a positive impact due to decreased emissions of benzene, ethylene dibromide, and other toxic compounds.

MITIGATION: No mitigation measures are necessary.

Transportation Management Measures

SETTING: This category includes a wide variety of control measures aimed at reducing the use of vehicles, controlling indirect sources, and improving traffic flows on public roadways.

IMPACT: Due to decreased fuel usage (gasoline and diesel) and increased efficiency, a positive air quality impact from decreased emissions of toxic air contaminants would result from these measures.

MITIGATION: No mitigation measures are necessary.

Alternative Fuels Program

SETTING: The major emphasis of this group of control measures is the replacement of gasoline and diesel fueled IC engines with alternative fuel engines.

IMPACT: This program would have both an additional positive impact on air quality due to decreased emissions of benzene and other toxic compounds and adverse impacts due to a potential for increased ambient concentrations of formaldehyde from methanol fueled engines.

An initial assessment of potential impacts from gasoline versus methanol fueled vehicles indicates that gasoline may potentially be more hazardous because of its aromatic content (benzene, toluene, xylenes, etc.) and additives (Kaufman, 1984).

Potential impacts exist from the implementation of a large scale program to replace fossil fuel powered vehicles with methanol fueled vehicles. Methanol is a neurotoxin, and combustion of methanol in vehicles can produce formaldehyde. Preliminary findings indicate that a methanol fuel program would be less hazardous than current fueling practices because of gasoline's toxic characteristics. The potential for increased risks from a methanol fuel program are currently being evaluated, and the District will assess these studies as they are completed.

When ingested in sufficiently high doses, methanol has systemic effects resulting in three potential diseases: 1) organic solvent poisoning, 2) systemic acidosis, and 3) central nervous system effects, including changes in the eye and basal ganglia (Cornish,1980). Industrial exposures are primarily vapor exposures, and although there may also be opportunity for skin absorption, this can be more readily controlled (Cornish,1980). The current OSHA standard for methanol is 200 ppm (260 mg/m³) averaged over an eight-hour work shift. Methanol can affect the body if it is swallowed, is inhaled, or comes in contact with the skin or eyes. Acute exposure to methanol, either by swallowing or breathing, may produce headache, weakness, drowsiness, lightheadedness, nausea, vomiting, drunkenness, and irritation of the eyes, blurred vision, blindness, and death. Chronic exposure to relatively high concentrations of methanol may result in headaches, burning of the eyes, dizziness, sleep problems, digestive disturbances, and failure of vision. Repeated or prolonged skin exposure may cause skin irritation. However, the Health Effects Institute, in a preliminary conclusion, states that, "chronic exposure to low levels of methanol emissions is not likely to trigger known mechanisms of methanol toxicity" (CCEEB, 1987). Similarly, synergistic relationships between methanol and other chemicals or drugs are currently unknown. Failure of an operator to take necessary safety precautions could cause adverse impacts.

Increased use of methanol as a fuel may result in increased formation of aldehydes, particularly formaldehyde. Formaldehyde can irritate the nose and throat and is a probable human carcinogen (EPA category B). It is currently undergoing review in the Tanner process for listing as a toxic air contaminant.

MITIGATION: In the event that significant risks are evident from a methanol fuel program, the District, other local agencies, and state and federal agencies would assess the methanol fuel program to determine

whether it should continue, be delayed until mitigation measures (e.g. catalytic devices) are possible, or not be implemented.

Field test demonstrations indicate that under most conditions, formaldehyde emissions (as measured by aldehyde emissions) can be mitigated below the exposure levels permissible to workers. (SCAQMD - 1135)

Because District authority over mobile sources is limited, mitigation of potentially adverse impacts from these sources will have to be coordinated with ARB and local agencies.

Selective Catalytic Reduction

SETTING: In order to reduce NO_x emissions, several measures in the AQMP provide for controls on electric power generating boilers, stationary gas turbines, small boilers and process heaters, as well as industrial, institutional, and commercial boiler, steam generators, and process heaters. Selective catalytic reduction (SCR) technology is one way in which industries could meet these control requirements. Ammonia, a colorless gas with a pungent odor, is used in the SCR process.

IMPACT: SCR technology requires the use of ammonia to decrease NO_x emissions. Ammonia is a toxic compound whose use is stringently regulated by the EPA, the Occupational Health and Safety Commission, and the Department of Transportation. Chronic exposure to high concentrations of ammonia (greater than 20 ppm) can result in headache, nausea, and reduced appetite. Eye, skin, and mucous membrane irritation can also result, depending on the concentration and duration of exposure. Burns or obstructed breathing may result from exposure to liquid ammonia or high concentration of vapor.

MITIGATION: Measures to reduce the potential risk of upset can be taken to reduce the probability of exposure. Proper safety and handling procedures will also help mitigate the potential for adverse health effects. Ammonia slip from faulty SCR design can also be alleviated through proper maintenance and appropriate application of SCR technology.

SECTION 4-18

ECONOMIC IMPACTS

Introduction

Tier I Control Measures

Tier II Control Measures

Tier III Control Measures

INTRODUCTION

Virtually every resident, business, and industry with interests in the Basin will be affected in some way by the AQMP. Although it is difficult to place an explicit dollar value on clean air, people in the Basin value many things made possible by clean air, including improved public health from reduced respiratory disease, less damage to buildings, healthier foliage, improved crop yield, and better visibility. The damage caused by air pollution to health, materials, forests, and agriculture amounts to \$9.6 billion annually, or \$2.07 per capita daily (SCAQMD, 1988).

The improvements in air quality and realization of the benefits clean air provides will occur over the next 20 years. Yet costs of the AQMP control measures are likely to be more readily apparent because these costs must be incurred before the benefits are fully realized. For example, an increase in vehicle prices to provide flexible-fueled vehicles may show up immediately on the sticker price of a car. Yet decreased atmospheric ozone concentrations will help prevent rubber parts on the car from cracking, thus decreasing maintenance costs.

The price tag for the programs to improve air quality represents only about one percent of the area's total \$387-billion gross national product. This represents an investment in air quality which will provide a stream of benefits beginning immediately and continuing for years to come. Just as investments in health care systems, education, or capital equipment are necessary to produce their own results, improved air quality requires investments in such areas as emission controls and new technology. However, since the air quality benefits of the AQMP show up indirectly, it is sometimes difficult to realize that these benefits are actually due to the implementation of the AQMP's control measures.

The spending on pollution control equipment and other measures to reduce emissions will be an economic stimulus to the Basin's economy. Not only will suppliers of control equipment and services benefit directly, but the industries which provide inputs to them will expand as well. In total, the gross regional product would rise by roughly two percent, and 84,222 new jobs would be created.

TIER I CONTROL MEASURES

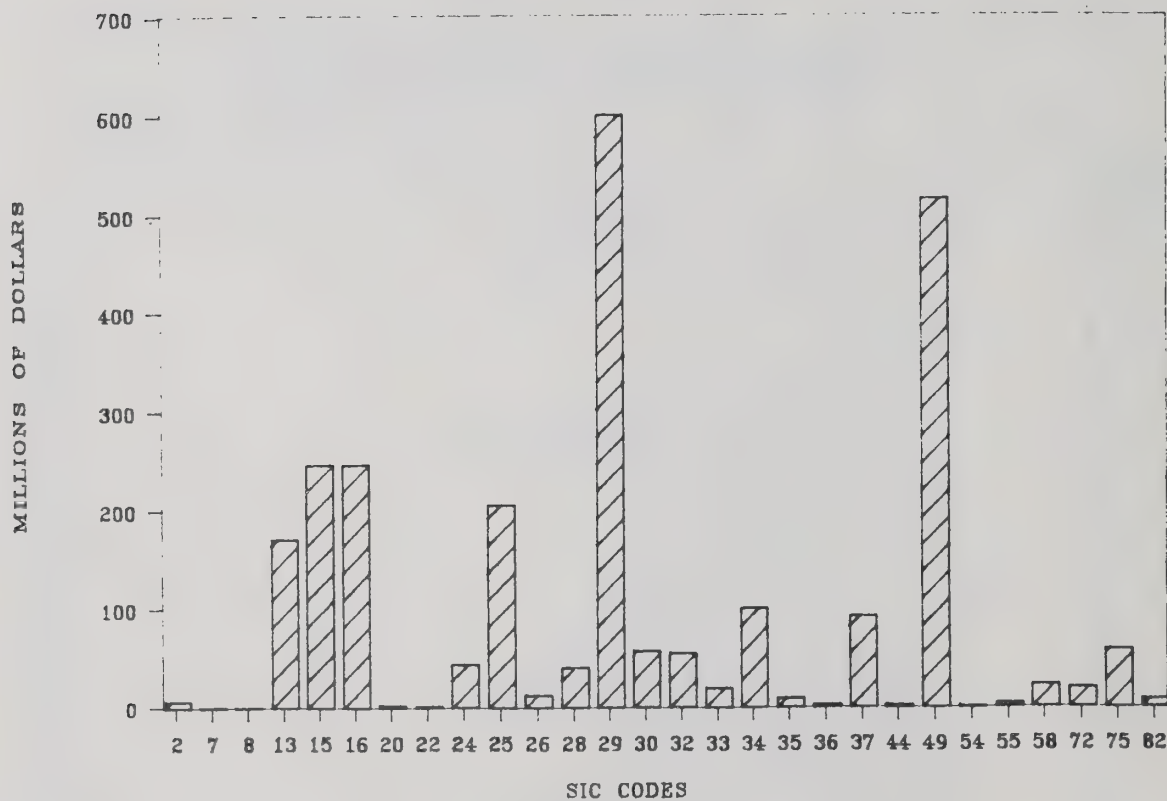
Because emissions occur across a wide variety of sources, the control measures in the AQMP cover many Basin industries. Annual control costs for selected industries, denoted by the two-digit Standard Industrial Classification Code (SIC), are given in Table 4-18.1 and are shown graphically in Figure 4-18.1. These costs include only Tier I stationary source measures for which cost and emission reductions data are available.

TABLE 4-18.1

AQMP CONTROL COST BY SIC CODE
(IN MILLIONS OF 1987 DOLLARS PER YEAR)

<u>SIC CODE</u>	<u>Standard Industrial Classification</u>	<u>Cost</u>
2	Agricultural Promotion - Livestock	\$ 6.6
7	Agricultural Services	0.9
8	Forestry	0.7
13	Oil and Gas Extraction	171.8
15	General Building Contractors	247.8
16	Heavy Construction Except Building	247.8
20	Food and Kindred Products	2.9
22	Textile Mill Products	1.4
24	Lumber and Wood Products	44.5
25	Furniture and Fixtures	206.0
26	Paper and Allied Products	12.8
28	Chemicals and Allied Products	40.8
29	Petroleum and Coal Products	601.1
30	Rubber and Misc. Plastics Products	58.0
32	Stone, Clay, and Glass Products	55.7
33	Primary Metal Industries	20.1
34	Fabricated Metal Products	101.0
35	Industrial Machinery and Equipment	9.5
36	Electronic and Other Electric Equipment	2.2
37	Transportation Equipment	92.7
44	Water Transportation	2.3
49	Electric, Gas, and Sanitary Services	515.2
54	Food Stores	0.9
55	Automotive Dealers and Service Station	3.8
58	Eating and Drinking Places	22.9
72	Personal Services	20.1
75	Auto Repair, Services, and Parking	58.8
82	Educational Services	8.4
TOTAL		\$2556.6

Figure 4-18.1
Industry Compliance Cost By SIC Code
(millions of dollars)



The total control cost of the Tier I control measures for point sources will be distributed by pollutant among various industries in the Basin. Petroleum refineries (Petroleum and Coal Products classification) and electric and gas utilities (Electric, Gas, and Sanitary Services classification) bear the brunt of the costs, i.e., 40% of the costs. They are followed by the construction industry (General Building Contractors classification) and the furniture manufacturing industry (Furniture and Fixtures classification), which together account for about 30% of the total control costs. Industries which will face the least control costs include the Agricultural Services, Forestry, and Textile Mill Products classifications.

Petroleum and Natural Gas Production and Distribution

SETTING: Oil and gas well drilling produce ROG and NO_x emissions through steam injection for enhanced oil recovery. Petroleum refineries produce ROG, NO_x, and SO_x emissions at various stages of the refining process: catalytic cracking, petroleum heaters, and gas flaring. Distribution of petroleum products such as gasoline and diesel fuel produces ROG emissions during transfer activities.

Control measures are varied and include SCR for refinery heaters and low NO_x burners for oil well steam generators, flue gas treatment for cracking units, and improved maintenance and inspection for service station gasoline and diesel pumps.

IMPACT: The cost of these control measures will largely be passed on to consumers, resulting in fuel price increases. The higher fuel prices will cause consumers (motorists, fleet operators, etc.) to conserve fuel somewhat, thus reducing vehicle emissions. (However, this effect is not expected to be large, since marked fuel price increases are needed to bring substantial reductions in consumption i.e. fuel prices are generally price inelastic.) This price-induced air quality benefit is in addition to that achieved directly by the control measure. Therefore, the increase in fuel prices caused by these control measures produces a dual air quality benefit.

MITIGATION: Although the price increases due to control costs cannot be directly mitigated, consumers can mitigate the impact of increased fuel expenditures by reducing driving and purchasing more fuel-efficient vehicles. Increased prices for petroleum-based fuels will make clean fuels such as methanol more cost competitive.

Gas Turbine Power Generation

SETTING: Power generation using gas turbines produces significant NO_x emissions in the Basin. The primary measures to control the emissions from gas turbines is use of selective catalytic reduction (SCR), steam in session or methanol fueling.

IMPACT: If use of SCR technology causes gas turbines used in cogeneration to be shut down, two major impacts can be anticipated. The electricity the gas turbines once provided would have to be made up by conventional utility power generation. And the process, heat provided by cogeneration would have to be made up by conventional boilers. Thus, emissions from replacement heat and electricity would be expected to increase. However, to the extent that in Basin fossil-fueled generation is decreased and/or made less polluting, this negative air quality impact is expected to be temporary.

If SCR retrofit costs are prohibitive, paper recyclers dependent on cogeneration turbines may close, increasing the volume of newspaper which needs to be disposed of in landfills. Paper manufactured from virgin materials would have to replace recycled waste paper. This would increase consumption of forest products.

Increased solid waste, in the form of newspapers formerly recycled, would be an additional environmental impact if paper recyclers were closed. If alternative buyers for the newspaper could not be found, up to 660 tons per day would need to be placed in a landfill (DEIR, Rule 1134, SCAQMD, August, 1988). Sanitation Districts would have to adjust their solid waste management plans to handle the increased volume. Disposal of the once-recycled newspaper would intensify the problem of diminishing landfill capacity, requiring a more immediate solution to the problem. Increased emissions from decomposing newspapers buried in landfills would constitute a further impact.

Greater energy use in paper manufacturing would also result if the paper recyclers closed. This is because more energy is used in processing wood into paper than in processing recycled newspapers into paper, thereby incurring greater costs.

MITIGATION: If paper recyclers relocate outside the Basin, rather than shut down, this impact would be mitigated. However, increased truck or rail travel would result from transporting newspaper for recycling out of the Basin and transporting finished paper goods into the Basin. The extent to which the increased travel results in emissions depends on the degree of implementation of the electrification and clean fuels measures for goods transport. Under another scenario, complying Basin paper recyclers would expand to replace the capacity lost when other recyclers closed. The negative environmental impacts would thus be avoided. Alternatively, newspapers could be shipped to foreign markets for recycling.

Utility Boilers

SETTING: Proposed District Rule 1135 specifies NO_x emission limits on fossil-fueled utility boilers. SCR retrofit, steam injection, or methanol use will be necessary to meet the emission limits proposed.

IMPACT: The retrofit cost will most probably be passed on to consumers through higher utility rates, subject to Public Utilities Commission procedures.

MITIGATION: Higher electric rates could cause an incentive to conserve, reducing electricity generation, and hence further reducing emissions. About 20% of the electricity consumed in the Basin is produced in-Basin with fossil fuel.

Internal Combustion Engines

SETTING: The control measure for internal combustion (IC) engines is to substitute them with electric motors. For cogeneration units which use a natural gas-fired internal combustion engine as a prime mover to turn an electric generator, this substitution is infeasible.

IMPACT: If IC engine-powered cogeneration is prohibited by this control measure, the electricity which would have been generated would have to be made up by utility-generated electricity, causing a negative air quality impact as described above for gas turbine cogeneration.

MITIGATION: This impact could be mitigated by methanol fueling for IC-powered cogeneration. However, considerations such as methanol fuel costs and retrofit costs may make IC-powered cogeneration economically infeasible. A further alternative is the use of external combustion engines, such as the Stirling engine. External combustion engines burn fuel in the open air, achieving more complete combustion and burning at lower temperatures. These features allow external combustion engines to operate with inherently lower levels of hydrocarbon and NOx emissions. (Source: Waste-By-Rail-Study, SCAG, 1988)

Transportation

SETTING: Transportation of biodegradable wastes outside the Basin is included among the control measures.

IMPACT: Electrified rail transport of biodegradable solid wastes outside the Basin could result in increased truck emissions if rail collection sites are fewer or further from the waste sources than present disposal sites. Increased costs resulting from transportation are likely to be passed on to consumers paying for waste removal. There would be a potential incentive for homeowners and other waste generators to cease paying for waste removal and dump their garbage illegally, or to compost their wastes. Although increasing residential densities may make this latter strategy more difficult, to the extent that composting does occur, some in-Basin emissions from natural decomposition would continue.

MITIGATION: The incentive for self-composting and illegal dumping would be removed if waste disposal fees were made mandatory. Truck emissions from refuse hauling would be reduced to the extent of clean fuels usage.

Sewage Treatment Facilities

SETTING: Control measures in the AQMP will affect both public and private sector sewage treatment facilities.

IMPACT: If emission limits are unable to be met, expansion of sewage treatment facilities may be restricted. If publicly owned treatment (POTW's) are unable to expand, a virtual moratorium on sewer hookups, and thus on construction of all types, would result. Economic growth could be severely

hindered as new businesses were prohibited from opening and existing ones kept from expanding. Attempts to provide private treatment facilities for new development would encounter the same controls and face constraints on expansion as well.

MITIGATION: In order to mitigate the constraining effect on growth that limited sewage treatment capacity would have, a series of water conservation measures could be implemented. Reducing the number of gallons of sewage per person would leave room for additional residents and businesses to be served. Measures to cut water use include toilet dams to reduce the water volume per flush, low-flow showerheads, restrictors on faucets, and surcharges on water bills for customers not reducing consumption. An added benefit of such a program would be conservation of water resources.

Agriculture

SETTING: In the agricultural sector, emissions from livestock wastes are to be controlled by using them as feedstock for processes producing digester gas (biogas). Since there is a market for this gas, the control measure may result in a profitable industry.

IMPACT: Combustion of digester gas in the Basin may hinder the Tier III strategy of eliminating combustion processes. In addition, using livestock wastes for digester gas production diverts them from use as agricultural fertilizer. Fertilizer needs must then be met by chemical products. Shipping the chemical fertilizer could entail more travel than shipping livestock waste fertilizer. Vehicle emissions may increase, in turn, if clean fuels or electrified transport are not used.

The uniform quality standards control measure for gaseous fuels such as digester gas will add to the cost of production of biogas from livestock wastes, reducing the industry's profits. The standards would also raise the cost of sewage treatment in POTWs, where digester gas is increasingly used as boiler and internal combustion engine fuel.

MITIGATION: The digester gas could be processed to achieve a uniform, pipeline-quality standard. It could then be put into gas utility distribution lines. The air quality impacts of shipping chemical fertilizer are expected to decline as agricultural land is developed.

Mandatory BACT

SETTING: The AQMP proposes that all air pollution control measures specify BACT as the technology to be used.

IMPACT: Mandatory BACT is a control method which is likely to have widespread and significant economic impact throughout the economy, especially the production sector. Product price increases, business relocation, and increased goods transport are the probable result, as discussed in the introductory section for Tier I control measures.

MITIGATION: Mitigation would be the attainment of equal emission reduction with an alternate technology.

Fuels

SETTING: Lower limits on the sulfur content of distillate and residual fuels used in utility, industrial, and refinery boilers are specified beyond the current standard.

IMPACT: Control measures to lower the sulfur content of these liquid fuels are estimated to increase prices up to \$.25/gallon (SCAQMD, AQMP, Appendix IV-A, control measure F-3, June, 1988). This increase in price would raise the price of natural gas, the competing fuel, by a similar amount. Electric rates would rise as treatment costs were passed on to utility customers.

MITIGATION: If natural gas prices were kept below the price of the lower sulfur content oil, it would be the preferred fuel. Emissions would decrease with the substitution of gas for oil. Natural gas pricing is controlled by the PUC, which is encouraged to adopt the appropriate pricing structure.

Transportation and Land Use Measures

These measures are intended to decrease vehicle use (i.e., vehicle miles traveled and number of trips initiated). Substantial reductions in both traffic congestion and vehicle emissions are expected from these measures. The Transportation Control Measures (TCMs) are classified into four groups: demand management, system management, facility improvements, and technology-based measures.

Demand Management

Demand management TCM's focus on reducing the need to travel. Various measures are proposed in Tier I that make vehicle use more expensive, subsidize less polluting alternative transportation modes, provide substitutes to transportation such as telecommunication, and prohibit certain vehicle uses.

ALTERNATIVE WORK SCHEDULES AND TELECOMMUTING

SETTING: Flexible work hours help spread the peak-hour traffic over a much wider time frame than more conventional work schedules. Although the number of cars traveling along the road and the distance they travel may remain constant, congestion is reduced. Thus cars can travel more quickly, reducing both travel time and vehicle emissions.

Telecommuting offers a substitute for transportation. Many information-related jobs do not require an employee's physical presence in the office, consequently work can be done at home or at satellite offices. The results can then be communicated to the office by facsimile machines, computer modems or mail.

IMPACT: Telecommuting may require the development of different management skills to ensure that tasks are accomplished and to coordinate separate employee efforts spatially.

Requirements that developers or employers establish neighborhood work centers would help improve the balance between jobs and housing. Yet costs to construct these facilities would be imposed. In the short term, companies would be burdened with unused office space. In the long-term, offices may be designed with smaller space per employee as partial absence due to telecommuting becomes more common. In turn, future office construction costs may fall because less space is required.

Telecommuting may be beneficial for lower income workers in information-related jobs, since transportation costs affect them disproportionately to their income. Also, construction and operation of neighborhood work centers in economically disadvantaged areas could stimulate their development. However, telecommuting involves two potentially negative impacts on lower income groups. First, it opens up the possibility for employers to draw on an

even more distant labor pool, where labor costs may be lower. This would remove the incentive for employers to develop these facilities in-Basin, where construction costs may also be higher.

Moreover, many low-income workers lack the skills most useful in information-related jobs. Thus, telecommuting may offer fewer opportunities for them. Telecommuting may act as a stimulus to home piece-work, an undesirable labor market practice.

A potential secondary impact is that employees who telecommute or have alternative work schedules may relocate to more distant residential areas, because they do not have to commute as often. Total VMT could rise if increased VMT from the new, remote residential locations were greater than VMT reductions from fewer trips.

MITIGATION: To mitigate the impacts of telecommuting on low income workers, a training program to teach information skills could be instituted. Increased labor enforcement efforts would be needed to prevent telecommuting from becoming a system of home piece-work.

Linking telecommuting and alternative work schedules with other TCMs could mitigate potential increases in VMT. For example, employees who telecommute or have altered work schedules could be required to utilize carpools, vanpools, or alternate-fuel vehicles for commuting.

PARKING MANAGEMENT

SETTING: Parking management strategies focus on raising the price of parking to induce people to drive less.

IMPACT: TCMs designed to reduce parking availability may also alter consumer choices in where they choose to shop. Along with the price of parking, the effort of finding a parking place is a consideration. To the extent that parking costs are assessed differentially between areas, consumers may choose to shop at places where parking costs are less. This may in turn increase vehicle travel, as well as cause businesses in the high parking cost areas to suffer declining sales. This may increase the incentive for retail businesses to move from central business districts to the suburbs.

Monetary incentives and disincentives for parking affect various groups differently. By subsidizing alternative transportation modes and discouraging solo driving, incentives from other regulatory behavior (e.g., taxation of rideshare benefits and non-taxation of free parking as an employee benefit) which encourage polluting habits can be balanced.

State tax credits for individuals or businesses who purchase vans for vanpooling provide an incentive to purchase these vehicles by effectively lowering their price.

MITIGATION: The lost tax revenue to the state can be made up either by reduction in other programs or by state tax or revenue increases.

System Management

SETTING: System Management TCMs include traffic flow improvements, nonrecurrent congestion relief, and indirect source controls for aircraft and ground service vehicles.

IMPACT: The first two TCMs require public investment in infrastructure such as traffic signals, computerized traffic management systems, and communication systems. The economic benefits from system management TCMs include better trip planning ability, trip time reduction, accident reduction, and increased fuel economy. Fuel use and emissions are correspondingly reduced.

The impact of this investment spending on local and state government is unclear. These improvements can be costly, yet no new source of funds generated from these system management measures seems likely. The indirect source controls for aircraft requires expenditure by airports.

MITIGATION: The fiscal impact on local governments of the increased public investment in transportation infrastructure could be offset by grants from state government. Also, since these TSMs increase overall vehicle fuel efficiency, the gasoline and diesel fuel tax could be raised, leaving motorists no worse off. Airports could finance their increased capital spending by raising landing fees.

GROWTH MANAGEMENT

SETTING: Growth management as a demand management strategy assumes no aggregate change in the level of population, jobs, and housing projected to exist in the Basin, but the spatial distribution of these three elements will be brought into closer proximity. Local initiatives, such as voter-approved growth control measures, are likely to alter the pattern of growth in the Basin.

IMPACTS: The improvement in the jobs/housing balance reduces commuting time and costs, because people live closer to their workplaces. Local business development may also be stimulated by the presence of nearby consumers. Another effect would be a more varied, and thus more stable, tax base.

By its nature, growth management implies redistribution of potential growth. These redistributive impacts are expected to improve the air quality and allow more efficient use of existing loss of potential tax revenues from expected growth through consolidation. Some local governments may, however, be affected. One growth management tactic, the imposition of development fees, results in higher housing prices. Restrictions on new construction can also raise housing prices by limiting supply. Housing price increases disproportionately affect lower and middle income groups by either pricing them out of the range of qualification for home ownership or raising their rents. Although an alternative action is relocation to areas of more affordable housing, these areas do not always offer sufficient job opportunities.

MITIGATION: Businesses affected from loss of sales due to changing patterns of growth can relocate to areas where their presence would provide more of a jobs/housing balance. Incentives in the form of special property tax rates, like those in a redevelopment district, would ease this transition. Local governments impacted by declining tax revenues could be aided by a

cooperative revenue sharing program. Sufficient low and moderate income housing could be provided near employment centers by subsidization. Revenues from development fees for higher-priced housing could finance the subsidy program.

FACILITY CAPITAL IMPROVEMENTS

SETTING: Some of these facility improvements, such as High Occupancy Vehicle (HOV) lanes, light rail, road paving, and freeway capacity enhancements, are public sector investments.

IMPACT: Sources of funding for these projects are also public and, as such, compete with other public investment and service demands. Without increases in local taxes, or without state or federal funding sources, these capital improvements may crowd out other public needs. This could result in a variety of potential physical impacts, such as reduced public health protection, recreation opportunities, etc. Detailed discussion of these potential impacts at this point would be overly speculative.

The air quality benefit achieved by this public investment could increase the attractiveness of the Basin as a location for future residents. This would raise land and housing demand and prices.

Facility improvements which require large private sector investments, such as rail line consolidation, may increase product prices and make them less competitive. For railroads, the increased freight rates could induce users to turn to truck carriers. This would increase energy consumption, because rail freight is less energy intensive per ton mile than truck freight. Thus, higher truck emissions could result.

MITIGATION: The increase in housing and land values, resulting from improved air quality from the AQMP's measures, will raise property tax revenues for local governments. The revenue increases can mitigate public investment in facility capital improvements. Hence, the fiscal impact on local governments through crowding out of other investments and services can be reduced.

Increased emissions due to substitution of truck for rail freight could be reduced or eliminated by the use of clean fuels for truck freight.

ENERGY CONSERVATION MEASURES

SETTING: Energy conservation measures allow individuals and businesses to use energy more efficiently and save money on energy expenditures.

IMPACT: The price for energy conservation devices must be paid before their benefits are received. For this reason, finance costs and the net present value of dollar energy savings must be included in considering the efficiency of each energy conservation measure. Given all these factors, the potential for cost-effective energy conservation investments remains substantial.

As discussed in the Electrification Strategy section for Tier III measures, electricity conservation is expected to provide a diminishing amount of emission reductions, because of the phasing-out of Basin fossil-fueled power generation. Natural gas conservation does provide a full benefit in combustion emission reductions.

Recycling glass and paper wastes has been demonstrated to conserve energy and materials. Recycled materials used as inputs in production typically consume only a fraction of the energy required to process virgin materials into finished products. Reduced quantities of virgin resources are consumed and solid waste is correspondingly reduced, easing burdens on landfills and trash incinerators. However, increased recycling on the scale envisioned depends on rising demands for these materials and their price competitiveness with virgin materials. Also, the mandating municipal recycling programs which do not cover costs impose fiscal burdens on the municipalities.

MITIGATION: To help reduce the initial capital cost impact of purchasing energy conservation devices, cash rebate programs of electric utilities can be expanded. The Public Utilities Commission, which has regulatory authority over private electric utilities, and municipal governments, which direct their own electric utilities, are encouraged to implement such programs.

This program assumes that demand for recycled materials, in both out-of-state and international markets can be tapped. Research institutions in both public and private sectors are encouraged to find new uses for recycled materials. When local recycling programs experience revenue shortfalls, refuse collection fees can be increased.

ECONOMIC ACTIVITY

SETTING: Tier I control measures can be implemented within five years. These measures affect a wide spectrum of activities and processes within the Basin. Both the effects and benefits of these measures, however, are expected to persist beyond the five year time frame. Development of new technology or management practices is not required to implement these measures, unlike those in Tier II and III.

IMPACTS: No businesses are expected to shut down because they are unable to find engineering solutions to reduce emissions. The technology exists to implement the Tier I control measures. However, shutdowns and relocations to areas outside the Basin may occur in response to the increased costs arising from the required controls. If businesses which continue to operate in the Basin (and which comply with AQMP regulations) can expand to replace this lost capacity, the Basin's output and employment may be maintained. Yet if control costs reduce profit significantly, businesses may be induced either to relocate or switch to producing a different, less polluting product.

In making the decision to relocate outside the Basin, a business owner may evaluate the cost of air quality regulations and other regulations. The owner may decide to move just outside the District's boundaries, to another state, or to a foreign country such as Mexico where environmental regulations are less stringent. Firms most likely to move to the more distant locations are those serving a national or international market where production facilities can be

located throughout that geographic market. Furthermore, impacts severe enough to cause leading firms within an industry to relocate may induce downstream industries, which provide them with goods and services, to relocate as well.

If a business decides to relocate outside SCAQMD's jurisdiction, moving costs as well as continuing input and product transportation expenses will be incurred. Additionally, employees will be faced with relocation costs, increased commuting costs (if distance permits), or unemployment. Increased vehicle emissions from transporting goods in and out of the Basin and any increases in commuting may affect the air quality negatively.

The mix of industries in the Basin is also likely to change. Although fewer jobs may become available in affected industries, significant job growth would occur in the air pollution control industry. This would include not only the regulatory and planning agencies associated with implementation of the Plan, but also manufacturers of air pollution control equipment. The operation and servicing of this equipment will also provide an economic stimulus to the Basin.

MITIGATION: Assistance could be provided to small businesses in the form of loans, similar to disaster loans, through the federal Small Business Administration. The loans could finance the purchase of control equipment. In cases where reduced energy consumption accompanies the installation of control equipment or less-polluting production equipment, funding sources such as the California Alternative Energy Financing Authority and the State Assistance Fund for Energy could be utilized.

GROWTH INDUCEMENT

SETTING: AQMP control measures are expected to bring measurable and noticeable air quality benefits. Visibility should improve, the number of smog alert days should decrease, and air pollution will probably be seen as less of a problem.

IMPACT: Improved air quality is likely to make the Basin a more attractive place for businesses and residents to locate, stimulating growth in the Basin. The increased attractiveness of the Basin and would be reflected in higher real estate prices, including increased house prices and rents. Increased housing costs will especially impact low and moderate income families.

MITIGATION: New stationary sources of emissions from growth are regulated by the District's New Source Review Rule (Regulation XIII). Hence, the air quality impact of the induced growth will be controlled. Rising real estate and housing prices brought about by cleaner air act to deter growth by making the siting of businesses more expensive and by making it more difficult for employees to find affordable housing. To mitigate the impact of rising housing costs on low and moderate income families, the increased property tax revenues from higher real estate values could be used to subsidize the construction of housing earmarked for these groups.

LOW AND MODERATE INCOME GROUPS

SETTING: The workforce in many of the industries affected by AQMP regulations is concentrated in the low-skilled and moderate-skilled segments; and by racial and ethnic minorities. Also, many of the products, such as gasoline, the price of which will rise with added control costs are consumed by low and moderate income families, including minorities, and will affect these groups disproportionately to higher income families.

IMPACT: The closing or relocation of businesses due to costs of compliance with AQMP regulations may cause Basin unemployment which is concentrated in the low- and moderate-skilled segments of the workforce, which have a high proportion of racial and ethnic minorities. In addition, some of the Plan's control measures act to discourage manufacturing industries, such as petroleum refining, furniture manufacturing, and printing, because of their relatively high levels of emissions. In turn, service industries, with lower emissions, are encouraged. As this shift from manufacturing to service industries occurs, opportunities for low- and moderately-skilled workers may shrink.

The loss of employment, especially in low- and moderate skill levels and among minorities, can have serious social, economic, and public health impacts. While some researchers have found that a number of people have ended up better than before (principally those who have been underemployed and the change led to better positions), there is substantial evidence that psychosomatic complaints and depression result from unemployment. (Group for Advancement of Psychiatry, 1982)

Brenner (1984) made a series of studies on the impacts of unemployment for the joint Economic Committee of Congress. Each of these studies estimated the impacts of varying levels of unemployment increase on social indicators such as total mortality (including increases in cardiovascular mortality and cirrhosis mortality), suicides, increases mental hospital admissions, increased total arrests, arrests for fraud and embezzlement, assaults, and homicide. He concluded that increases in unemployment are followed by increased social pathology. He further observed that while these effects of losing a job tend to fall disproportionately on poor young people and minorities, the effects clearly spill over onto people who continue to hold jobs. Not only may the employed fall prey to increased crime, but their working conditions may deteriorate as they are called upon to work harder because of cuts in personnel. In addition, they may find fewer opportunities for promotion and may confront the possibility of being laid off themselves. (Penrod, 1987)

The impacts of a large scale loss of employment resulting from implementation of the AQMP's measures could have direct significant adverse impacts on public health and well-being and indirect impacts on governmental and private law enforcement and social support systems which must deal with these effects. For example, the unemployed may require assistance in the form of food stamps, welfare payments, and free medical care. As greater numbers slip under the poverty line, state assistance programs may be strained, causing increased reliance on federal support.

Inflation induced by producers passing on compliance costs may impact low- and moderate-income families most. Basic products such as gasoline, electricity, and furniture constitute a larger share of a low income family's income than higher income family's. Since these basic products are more likely to experience price increases from the passing-on of compliance costs, lower-income families are disproportionately impacted. As a result, they will have less disposable income left for the purchase of other goods and services, which may then experience decreases in demand.

MITIGATION: Socioeconomic and public health impacts from plant closures and increases in unemployment can be mitigated by the use of some or all of the following measures: unemployment insurance, job training, relocation assistance, job placement activities, and career counseling. Some of these actions can be taken by employers and some by the state Employment Development Department (EDD). The EDD would have the major responsibility of mitigating the impacts of unemployment by improved employment opportunities for laid-off workers. If compliance costs with AQMP control measures could be identified as the cause of business closing or relocation leading to worker unemployment, special provision could be made for increased or extended unemployment insurance benefits.

It is expected that, after a time lag, the laid-off workers would find other employment (although perhaps not within the Basin), thus eventually mitigating the impact to insignificance on a regional scale. Until or unless the re-employment activities are successful, the results shown above would constitute unmitigated adverse impacts.

For products produced by regulated industries, such as gas or electric utilities, the impact of price increases from compliance costs could be cushioned by extending the "lifeline" portion of electricity or gas consumed. Thus a greater initial, low-priced portion of electric or gas service would be allowed. Approval by the California Public Utilities Commission would be required for increasing the lifeline allowance.

Price increases caused by compliance costs make substitute products whose production does not cause emissions more competitive. Thus consumers will tend to re-orient their purchases toward the less polluting products. Though this effect does not give the consumer, especially the low and moderate income consumer, more purchasing power, it does act to limit the degree to which compliance-induced price increases can reduce purchasing power.

MODERNIZATION OF PRODUCTION PROCESSES

SETTING: Firms periodically update their operations to produce new goods or improve existing products. Tier I measures that require control equipment to be added to new or modified equipment may cause companies to delay or forego modernization because of the control costs that would be incurred.

IMPACT: If the emissions from new equipment are greater than those allowed by the AQMP's control measures, firms will be required to incur further costs to comply with applicable rules and regulations. Firms would then be faced with a choice between modernizing their plants with newer, more efficient, and less polluting equipment to increase their production capacity or limiting production capacity so that additional control costs are not incurred. To the extent that plants choose to forego modernization or expansion, improvements in air quality that would occur as a result of modernization will not take place.

MITIGATION: Since air quality rules are adopted with compliance deadlines occurring years later, businesses have a time period in which to avoid this problem. Furthermore, State law provides a five-year grace period after the installation of new (control) equipment for compliance with air quality regulations. Beyond these provisions, there is no mitigation measure for this impact.

TIER II CONTROL MEASURES

Substitution of alternative fuels and electrification of portions of the Basin's vehicle fleet are expected to have impacts as noted for these measures in Tier I and Tier III.

Emission Charges

SETTING: An alternative to setting an absolute emission limit, or standard, is to institute a sliding scale of fees or charges which depend on the level of emissions. The charge would be a fee on a specific product rather than an emission fee charged to businesses. This alternative is a more cost effective

emission control and is exemplified in Tier I Measure A-8, Control of Emissions from Architectural Coating.

IMPACT: Emission charges on polluting products would raise their prices and encourage consumers to use non-polluting products. By providing a range of alternative products and prices that reflect products' emissions, consumers would be allowed to make their own choices about the products they choose to purchase.

The level at which the emission charges are set is important. When established at the optimal level, emission charges would encourage the use of non-polluting products, but would also allow consumers choices in the products they wish to purchase. Charges which are set too low may allow more emissions to be released than desired. Charges set at too high a level may restrict the availability of certain products unnecessarily.

Although revenues would be collected through the charges, the funds collected could be too small to finance successful research and development efforts on emission reductions.

MITIGATION: The emission charges system could be implemented on a trial basis in selected industries in order to find the proper dollar amounts of the charges. Phased implementation, i.e., setting a timetable of steadily rising charges over future years, could also ease dislocation.

TIER III

The economic impacts of the Tier III control strategies are the most profound of all those in the AQMP. However, since they rely on as yet-to-be available technologies, the specific nature of their economic impacts cannot be discerned completely, although generalizations about the type of economic impacts can be made.

Surface Coating and Solvent Use

SETTING: Tier III implementation calls for the complete elimination of ROG-containing coatings and solvents in the Basin.

IMPACT: Since the chemical make up of reformulated solvents and coatings to be developed is not known at this time, impacts of their use cannot be identified. For example, reformulation of exterior paints could affect covering ability, causing consumers to turn to substitutes such as vinyl siding or heavy textured coatings, which could have health impacts or alter the historic character of local architecture.

Restrictions on solvent use may induce industries using large amounts of solvents to relocate outside the Basin. The effects of relocation have been discussed previously for Tier I measures.

The use of emission charges as a control measure for solvents and coatings may have the unintended effects discussed in Tier II.

MITIGATION: Potential health impacts of reformulated or substitute coatings and solvents should be researched. Only compounds which do not significantly affect health should be allowed. Preservation of the historic character of local architecture is the responsibility of local communities. It could be accomplished by the creation of special zoning overlay districts in which exterior architectural modification is controlled.

Clean Fuels for Vehicles

SETTING: Tier III specifies the conversion of vehicles in the Basin to clean fuels, completely eliminating fossil fuel use in vehicles.

IMPACT: Emissions from vehicles using petroleum based fuels account for a larger proportion of Basin emissions. The more expensive it is to re-tool for the manufacture of new methanol-powered vehicles, retrofit existing ones, and fuel these vehicles, the greater the pressure for exemption and evasion from the requirement. Phasing out existing gasoline and diesel vehicles as alternately fueled vehicles are phased in may provide an incentive for owners to prolong the expected lifetime of the gasoline or diesel powered vehicle. Additionally, evasive tactics such as registering vehicles out of state could be expected to increase. These responses will reduce the emissions reduction benefits from the clean fuels strategy.

MITIGATION: Stricter enforcement with significant penalties, such as loss of driving privileges, could reduce the impacts of illegal registrations. The impacts of extending the lifetime of conventional vehicles will eventually correct the remedies. Any reductions in clean fuel benefits would be temporary.

Vehicle Electrification

SETTING: Vehicle emissions can be eliminated entirely for those portions of the fleet switching to electric vehicles. Substitution of electric vehicles for liquid-fueled ones is expected to increase the demand for electricity.

IMPACT: Vehicle charging is expected to occur at night, when demands on generation capacity are otherwise at their lowest. Thus existing electrical resources may be able to be used more efficiently. This improved "load factor" (average demand divided by highest demand) may be great enough to reduce per-KWH electricity costs. However, peak-hour charging requirements for range and endurance, and electrification of railways and transit, will add to the need for additional generating capacity.

Since electric generating plant additions which utilize fossil fuel combustion are unlikely to be allowed in the Basin, the direct physical impacts of expanding generating capacity are expected to be slight. However, indirect physical impacts may be large. Demands made on regional water resources, construction materials, labor, capital and other construction and operation inputs will be strong (for the scope of electrification projected). Competition for these resources may cause inflation in these markets and make them prohibitively expensive or unavailable for other in-Basin projects. Particularly impacted may be municipal electric utilities, whose required expansion may be disproportionate to that of investor-owned utilities. Municipals may be hard pressed to provide the financing, technical, and management resources needed for this expansion.

Electric vehicles themselves, while producing no emissions from internal combustion, nevertheless have certain environmental impacts. Maintenance and disposal/recycling of the lead-acid batteries poses a health danger from lead poisoning and may cause more lead-containing materials being landfilled. Also, if electric vehicles have reduced performance characteristics compared to conventional ones, e.g. shorter range, consumers may purchase

more than one electric vehicle to replace their conventional ones. This would greatly increase the drain on natural resources in vehicle manufacturing, and increase parking problems.

MITIGATION: Since the remaining potential for cost effective electricity conservation measures is large, it is an alternative to the construction of new generating facilities. The conserved electricity is more cost effective because the cost of conservation, per kWh, is less than the current electricity cost or the cost for new generating facilities. Consequently, the negative environmental impacts of power plant construction and operation can be avoided to the extent that conservation reduces electricity demand. Conservation also stimulates the local economy more than out-of-Basin power plant construction. Some portion of the conservation devices used in the Basin would be manufactured here and their installation would create additional jobs.

In-Basin electricity production by non-polluting means, such as photovoltaics or wind energy, is an alternative to fossil-fueled generation. These alternative energy sources also may have a cost advantage over remotely generated power, due to transmission line losses. These energy sources have environmental side effects of their own: visual and aesthetic impacts and noise from wind turbines.

To some extent, the additional generating capacity and conservation/renewable energy are mutually exclusive. Large additions to capacity compete with resources which could be used more cost-effectively in conservation devices, utility load management and conservation programs (including cash incentives), and the development of an investment in emission-free conservation technologies.

SECTION 4-19

EARTH

Impacts on the Earth

SETTING: The control measures described in the AQMP are expected to change current land use and development patterns in order to reduce air emissions from everyday activities. Transportation infrastructure improvements are also included as measures in the AQMP.

IMPACT: Development along the coastline, including construction of SCR devices to control NOx emissions, and continued expansion of development into the foothills of the Basin's mountainous areas is anticipated . This activities may require land to be graded or otherwise modified in order to construct highways, increase urban densities, and install pollution control equipment.

MITIGATION: Local jurisdictions can help mitigate the impacts of construction through zoning laws and by designating and protecting of open spaces. Builders and developers can also help mitigate the impacts of development and construction by being sensitive to the local topographical features.

SECTION 4-20

AESTHETICS

Aesthetic Impacts

AESTHETICS

SETTING: Visual impacts resulting from implementation of the AQMP include increased construction resulting from the need to accommodate population growth; electrification of urban transit systems and railroad line haul routes which will probably require installation of overhead electric wires and construction of additional transformer facilities; and, installation of ship berthing facilities.

IMPACT: Increased residential and employment densities may have a substantial impact on the current scenery as taller buildings and more clustered development occurs. Pressures to develop open spaces will also be present, thereby decreasing the aesthetic value of these areas as development occurs.

Particulate matter resulting from the construction of buildings and freeways may cause temporary decreases in visibility. On the other hand, many control measures in the AQMP are intended to control particulate emissions from various activities, including construction. These measures will act to significantly decrease particulate emissions and improve visibility. Furthermore, as the strategies proposed in the plan to control precursors to particulate formation in the atmosphere are implemented, visibility will be further improved.

Electrification of urban mass transit systems and railroad line haul operations may produce a significant visual impact in the Basin from installation of overhead electric wires. Also, construction of above ground cables for ship berthing and fixed rail mass transit systems may also have an impact on the existing scenery.

MITIGATION: In implementing the proposed project, community regulations should be strictly adhered to regarding aesthetic aspects of all development. During construction, any natural vegetation that is removed should be at least partially replaced with some native vegetation as well as ornamental landscaping. Designing transformers facilities to blend in with surroundings and underground electric lines and/or cables should be done for aesthetic purposes.

SECTION 4-21

ARCHEOLOGICAL/PALEONTOLOGICAL HISTORICAL IMPACTS

Archaeological/Paleontological/Historical Impacts

ARCHAEOLOGICAL/PALEONTOLOGICAL/HISTORICAL

SETTING: According to archaeological clearinghouses, the majority of archaeological sites within the Basin have already been severely disturbed. However, the need to accommodate population growth will provide motivation to develop and build on currently undeveloped land. Also, greater pressure to increase current residential and employment densities is expected to result from implementation of the AQMP control measures.

IMPACT: From the human cultural resource standpoint, the proposed project may have two categories of potentially resources: prehistoric indicators of early man, and more recent examples of early Southern California history. To the extent that such sites exist, they may lend valuable insight into past Native American lifestyle and habits in Southern California. The yet undiscovered archaeological sites may be found as new land is explored for development and given the significant deterioration of existing archaeological sites, information to be gleaned from new sites may be significant. Additionally, increased residential and employment densities will also bring pressure for more efficient use of existing developed land. This may in turn threaten homes and buildings with historic characteristics as more dense redevelopment occurs.

MITIGATION: To determine whether such cultural resources exist, and to weigh their significance, particular sensitive cultural areas should have site surveys and record checks to determine any potential paleontologic resources. Newly developed sites need not be monitored by a paleontologist during grading, but in the event that fossils are discovered, a paleontologist should be contacted immediately so that an assessment and determination can be made promptly. Artifacts and ecofacts should be sampled and collected. Every effort should be made to determine the original source of the fill material should the sampled material prove to be of archaeological significance.

For existing structures, which may have potential historical value, attempts should be made to preserve the site and still develop the property in a manner generally commensurate with existing plans.

CHAPTER 5

ALTERNATIVES TO THE PROPOSED PROJECT

Introduction

Project Description

Summary of Areas of Controversy

Project Alternatives

Project Benefits

CHAPTER V ALTERNATIVES TO THE PROPOSED PROJECT

Five basic alternatives to the proposed project are presented in this EIR. These alternatives are not discussed in terms of variations in control measure makeup within each tier, but rather in terms of the achievement of the basic objective of the AQMP itself -- the attainment of ambient air quality standards.

No Project Alternative

Consideration of the No Project alternative is required under CEQA. Non-adoption of the AQMP would imply that the original AQMP prepared in 1979 would continue in force, since the 1982 AQMP has been disapproved by the federal Environmental Protection Agency (EPA). There are no apparent environmental benefits from this action, and significant adverse consequences would fall into two general categories -- legal and environmental.

Legal consequences could include the potential application of sanctions against the Basin by the federal government, as required by the Clean Air Act. These may take the form of funding restrictions for federal highway and clean water grants, reductions in air quality planning grants, and construction bans on major projects. The Clean Air Act also directs the EPA to prepare its own non-attainment plan if the locally prepared plan is found to be inadequate. The federally-prepared plan must demonstrate attainment and may not necessarily incorporate the particular needs or constraints of the Basin, introducing potential long-term conflicts.

The most significant adverse environmental impact of the No Project alternative on the Basin would be on air quality. Despite the stringent air quality regulations currently in effect, baseline emissions of criteria air pollutants will increase appreciably between the years 1985 and 2010. This result is a consequence of strong regional growth in population, housing, vehicle miles traveled, and number of daily vehicle trips. The net effects of this growth on the emissions forecast under current planning and regulatory

conditions show emission increases of 32% for ROG, 41% for NO_x, 48% for CO, 36% for SO_x, and 48% for PM. Non-attainment status could be expected to continue for all criteria air contaminants except SO_x, and exceedances may increase by wider margins.

Partial Implementation Alternative

This alternative involves the partial implementation of the proposed AQMP as a means of moving closer to attainment, but without the extra effort or technological breakthroughs necessary to ensure that the standards are reached. Specifically, this alternative contemplates the implementation of Tier One and Tier Two control strategies, which are technologically and economically feasible now or in the near future. The potential emission reductions for both rules are shown in Table 5-1.

TABLE 5-1

SUMMARY OF TIER I AND TIER II EMISSION REDUCTIONS

	POLLUTANT (TONS/DAY)				
	ROG	NO _x	CO	SO _x	PM
TIER I	608	585	2744	82	262
TIER II	204	156	535	19	33
TOTAL	818	741	3279	101	295

While the air quality impacts for this alternative have not been modeled, there is an emissions shortfall for attainment equal the amount of emissions proposed for reduction by Tier III strategies. This shortfall is estimated to be: 228 t/d of ROG; 100 t/d of NO_x; 936 t/d of CO; 17 t/d of SO_x; and 7 t/d of PM.

Implementation of this alternative would avoid the adverse environmental impacts which may be caused by Tier III strategies, especially those associated with the electrification of passenger vehicles. In this sense the alternative is superior to the proposed AQMP. However, this alternative would not achieve the basic goals of the project -- the attainment of clean air standards. As in the No Project alternative, the region could also be subject to significant economic and legal sanctions.

Additional Emissions Reduction Effort Alternative

This alternative envisions the implementation of additional emission control efforts beyond those proposed for the AQMP in order to attain the clean air standards. In this way attainment could be achieved with a reasonable margin of safety in the event that other control measures are not as effective in reducing emissions as expected. Possible additional control efforts beyond Tier III are:

Electrification of all heavy duty vehicles;

Clean fuel for all off road vehicles;

Mandatory incremental emissions reductions for all District permitted sources as a condition of periodic permit renewal;

Electrification or clean fuel use for all residential, commercial and industrial sources where fossil fuel is not otherwise eliminated.

Potential emission reductions for these measures have not been estimated, therefore the potential air quality benefit or margin by which the clean air standards would be met is not known. These measures would require advances in technology that are not currently envisioned. Implementation of these measures would probably have adverse environmental consequences more severe than those anticipated for the AQMP. However, these impacts

cannot be estimated given the undefined nature of the emission reduction measures.

Delayed Compliance Alternative

This alternative proposes the same emission reduction strategies as the proposed AQMP. The difference between them is that the delayed compliance alternative would allow a longer time for implementation -- perhaps to the year 2017 or 2027. The most prominent adverse environmental impact of this alternative is the continued non-attainment of clean air for a considerably longer time than anticipated in the proposed AQMP. The other physical environmental impacts of plan implementation would be about the same as under the proposed plan. However, the disruptive socioeconomic impacts would be lessened in severity since the longer implementation period would allow for an easier adjustment to the profound changes anticipated to be caused by the plan.

Alternative Growth Scenario

The Alternative Growth Scenario option would include measures similar to those proposed in the 1988 AQMP Revision. However, the degree of implementation and the number of measures required overall may vary because of differences in the geographical allocation of projected growth. SCAG's Growth Management Alternative 4 (GMA-4) is a potential alternative growth scenario. Also, the Department of Finance has projected less growth than the future population anticipated under both GMA-3 and GMA-4. Lower projected growth may also provide an alternative.

GMA-4 acknowledges the substantial growth which will occur in the Basin in the near future. The greatest percentage increases should occur in San Bernardino and Riverside Counties. GMA-4 differs from the alternative used in the 1988 Revision (GMA-3) because it assumes a more harmonious jobs-housing balance in these outer areas. Employment should "follow" these people to these communities thus reducing the employment base in Los Angeles County. The urban areas would consist of carefully designed

communities which incorporate home, work, and service sectors within a convenient radius.

COMPARISON OF THE ALTERNATIVES

The alternatives presented in the above section will not attain the ambient air quality standards as efficiently or effectively as the proposed AQMP. A comparison of each of the alternatives demonstrates this. Obviously, the No Project Alternative will not move the Basin toward attainment of the standards. This alternative assumes that we would continue current regulations, but would not assess or implement any other strategies. This alternative, therefore, provides no environmental benefits, especially in light of the projected Basin population growth. This growth will lead to continued emissions while the No Project Alternative provides no solutions. The resulting air quality could be worse than that which we presently experience. Attainment of the Federal standards would never be met with this alternative and the Basin would be faced with significant legal and environmental problems.

Similarly, legal and environmental problems would also result from the Partial Implementation Alternative. This alternative requires the use of Tier One and Tier Two Control Strategies without researching and implementing any additional technology. This would discourage continued research in other vital areas such as alternative fuels, air pollution abatement equipment and alternative power sources (solar, wind etc.). While short-term strategies may provide some benefits to the air quality and the overall environment of the Basin, they are not enough to achieve the Federal standard. Such policies may be just stringent enough to offset the increased Basin growth. As the Basin population continues to increase, long-range goals which promote new advances will be needed to attain the Federal Standard. This alternative would provide more benefits than the No Project Alternative, however, it will still not succeed in the attainment of the Federal standards.

The Federal ambient air standards for the six criteria pollutants were established to protect public health and the environment. They are set at demonstrated safe levels of exposure to the various contaminants.

Therefore, attainment of the standards is sufficient to protect the environment. Since public health is protected at these levels the Additional Emissions Reduction Effort Alternative is unnecessary. This alternative calls for additional control measures which extend beyond the scope of the Tier III section of the AQMP. Technology for such long term ideas and strategies is not available at this time and is not expected to be available in the near future. If the AQMP is adopted and followed as presented, these additional measures would prove superfluous. The Federal standards can be met with the control measures that are being proposed and the technology necessary to implement them is currently available.

The results of the Delayed Compliance Alternative would be similar to those of the Partial Implementation Alternative. While some health and environmental benefits may be derived from this alternative, the air quality benefits would be less than under the proposed AQMP. This plan would delay the implementation of the control measures in the plan until the year 2017 or 2027. Since the population of the Basin is expected to be nearly 17 million by that time, any benefits would be offset by the tremendous growth. Therefore, any absolute air quality benefits would be minimal. This alternative will not attain the Federal Standards for which the deadline has already been extended. It would, however, provide a more gradual adjustment so some of the more significant changes/disruptions caused by the AQMP.

Examination of these four alternatives demonstrates that none is as effective as the AQMP for attaining the Federal ambient air standards. Attainment of the standards is currently a primary goal of the District to ensure public health and safety as well as a clean environment. Also, the Basin would suffer severe economic hardships should the federal government (EPA) impose noncompliance sanctions.

CHAPTER 6

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Cumulative Long-term Impacts

Rationale for Plan Implementation at This Time

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

This chapter describes the cumulative long-term effects of AQMP implementation on the environment. The purpose of the AQMP is to attain ambient air quality standards by the year 2007. The actions needed to accomplish this goal will have some effects on narrowing the range of beneficial uses of the environments and may impose some long-term risks on health or safety. Environmental impacts and mitigation measures are discussed in Chapter IV of this EIR. The relationship to and cumulative long-term impacts of the plan on the environment are discussed below.

CUMULATIVE LONG-TERM IMPACTS

Plan implementation will tie up public and private funds in non-productive assets (pollution control equipment) which could cause inflationary pressures and could result in job losses or the reduced competitiveness of industries located in the Basin with those located outside. This is a result of the fact that the increased costs associated with certain control measures may be passed from operators to consumers. These increased prices for manufactured goods may result in job losses or reduced competitiveness if businesses relocate to less costly areas. Consumers may attempt to buy their products from manufacturers in other parts of California or the nation.

In the early 1980s, the Basin began undergoing a transition from a goods-producing economy to an information-based service economy. Other sectors with significant employment gains included finance, insurance, and real estate. The long term impacts of the AQMP include an acceleration of these current trends. Industry will avoid heavy manufacturing in favor of lighter, "cleaner" industries. Consequently, a more service and information based economic base will result.

The transportation portion of the plan requires careful planning in the Basin's newly developing areas to ensure homogeneous land uses. Ideally,

such mixed-use areas would provide residents with close, convenient access to work, schools, and service areas. This would reduce unnecessary driving and consequently reduce transportation-related emissions. However, increased urban density will also result.

The plan will not cause population growth itself, but will affect location decisions. The extensive urbanization of Los Angeles County will cause people to move farther east toward the low desert areas. The greatest percentage of the Basin's population growth is expected to occur in San Bernardino, Riverside, and southern Orange Counties. (SCAG, 1987) The additional demand for public services including schools, fire and police protection and recreation areas will increase development pressures.

The implementation of air pollution control measures, especially for Tiers II and III, will cause massive infrastructure changes in the region. These changes could impact the ability of government to provide public services.

The large-scale use of clean fuels will cause impacts beyond the boundaries of the Basin. Various activities must be undertaken nationwide to provide these fuels. This will include the developing feedstocks such as natural gas and coal, refining the fuel, and providing an infrastructure for its transportation.

RATIONALE FOR PLAN IMPLEMENTATION AT THIS TIME

The 1988 Revision to the AQMP will have significant positive impacts on air quality as well as the potential for negative impacts on other aspects of the environment. The reason that a Plan of such major significance is proposed for implementation over such a relatively short time frame is that strong efforts must be taken in an expeditious manner, because of the Basin's severe air quality problems. Poor air quality adversely affects public health and well being, in addition to its adverse economic impacts.

The South Coast Air Basin has the worst air quality in the nation. This fact, combined with a rapidly swelling population, threatens to continue and worsen this problem for the foreseeable future. Such an ambitious program will have to be undertaken if clean air is ever to be achieved. To eliminate the continuing and possibly growing threat to public health, the plan was formulated for implementation in the shortest time frame possible. To do

otherwise would be to allow unacceptable air quality problems to continue into the indefinite future.

CHAPTER 7

SIGNIFICANT IRREVERSIBLE CHANGES WHICH WOULD BE INVOLVED IN IMPLEMENTATION OF THE PROPOSED AQMP

SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES WHICH WOULD BE INVOLVED IN IMPLEMENTATION OF THE PROPOSED AQMP

Implementation of the AQMP will irreversibly commit future generations to the use of an environment in the South Coast Air Basin which will be greatly changed from current conditions. This is assumed because the very large commitment of resources to plan implementation would make any undoing of the actions very unlikely. The irreversible changes are summarized and identified below.

Significant amounts of non-renewable resources will be required to implement the plan. These include land, money, manpower, energy and materials. Increasing amounts of these finite resources may be needed to achieve the goals of certain control strategies.

There may be increases in the costs of living and doing business in the Basin due to the commitment of resources to the restructuring of the region. These increases would be reduced somewhat through savings resulting from these same actions.

A disjunction between business operations and social conditions within the Basin as compared with the rest of the nation and the world may develop. Areas which do not have to meet these emission requirements and control mandates will not experience the same degree of change.

The creation of a degree risk of environmentally damaging accidents from the development and use of clean fuels, energy supply development, hazardous waste disposal, and emission control devices. Any and all available mitigation measures should be used to ensure that public health and safety is not adversely affected.

CHAPTER 8

GROWTH INDUCING IMPACTS OF THE AQMP

GROWTH-INDUCING IMPACTS OF THE PROPOSED AQMP

The growth inducement attributable to the AQMP is unclear. The Plan assumes a certain level of growth in the Basin, and proposes air emission reduction measures to attain clean air standards, while at the same time accommodating the forecasted population increases. The growth inducing influence of the AQMP itself would be the product of two opposing forces. The Plan could increase growth pressures because of the improved quality of the environment and perhaps perceived quality of life improvements brought about by the emission reduction measures; counterbalanced, at least in part, by a growth reducing influence of the social and economic costs of plan implementation. To attempt to determine which would be dominant would introduce undue speculation, which is not allowed under CEQA guidelines. The opposing forces affecting growth inducement are listed below.

Potentially Positive Growth-Inducing Impacts

The improved air quality resulting from the attainment of clean air standards will induce more people to move into the Basin. It will be a much more healthful place to live.

Improved public health and welfare will result from the attainment of healthful air quality. The demonstrated adverse health effects from smog (particularly to sensitive receptor groups) will be eliminated.

Improved quality in other environmental areas will also result from air quality controls. Plant and animal life will no longer be adversely affected by the pollution. Every year millions of dollars worth of agricultural crops are damaged by the smog. Water quality will also be improved.

The carefully planned urban communities will result in a more beneficial jobs-housing balance, less urban sprawl, less commuting, and reduced transportation demand. The communities will aim to incorporate neighborhoods, workplaces, and services within a convenient radius. There

may be increases in employment opportunities associated with plan implementation activities.

There will be concomitant life-style improvements related to the above.

Potentially Negative Growth-Inducing Impacts

The increased cost of doing business in the Basin may result in impaired economic competitiveness, increased consumer costs, and possible job losses from business closures and relocations. Businesses may decide to relocate to other areas of the country which do not impose such strict regulations.

The increased costs of various manufactured good may increase housing costs.

Increased energy costs may result from the increased demand.

Increases in per-mile transportation costs for both public and private transport modes may result.

The necessary changes in regional infrastructure may be costly, time consuming, and disruptive to local communities.

Changes in life-style which many people may either dislike or cannot adjust to may result from the changes proposed in transportation and community planning measures. Public transportation and minimal commuting will be encouraged.

Increases in inflationary pressures brought about by the expenditure of large sums of money on non-income producing assets may result. For example, the purchase of pollution abatement equipment may result in increased revenues for a firm out of state while increasing costs to consumers in the Basin. This may be more than offset by increases in employment attributable to the AQMP.

Possible restrictions in personal mobility and ease of travel due to increased reliance on mass transit may result. Different vehicles for intraregional travel and travel outside the region may need to be used.

The implementation of the many changes needed to attain the air standards may create a disjunction between the Basin and the rest of the nation and world. Other economic losses may include loss of shipping and other goods transportation activities as well as competitive disadvantages.

REFERENCES CITED

REFERENCES CITED

American National Standards Institute (ANSI). 1981. Safety Requirements for the Storage and Handling of Anhydrous Ammonia, Compressed Gas Association, Inc., Arlington, Virginia, May 12, 1981.

Air Resources Board. Method Used To Develop A Size- Segregated Particulate Matter Inventory (Draft). January, 1988.

Barbour M. ed. Terrestrial Vegetation of California. John Wiley and Sons: New York. 1977.

Benchley, D.L., and G.F. Athey. 1981. Assessment of Research and Development (R & D) Needs in Ammonia Safety and Environmental Control. September, 1981. (Pacific Northwest Lab, Richland, VA).

Brenner, M. Harvey. 1984. Estimating the Effects of Economic change on National Health and Well-Being. Joint Economic Committee, Congress of the United States. USGPO. June 15, 1984

Broadbent, J., M.C. Shikiya, and T. Taylor. 1985. Acid Deposition in the South Coast Air Basin: Control Strategies. South Coast Air Quality Management District, February 1985.

California Council for Environmental & Economic Balance (CCEEB). Alternative Fuels as an Air Quality Improvement Strategy. November 1987.

California Department of Transportation. Travel and Related Factors in California: Annual Summary, 1987. Sacramento, CA. 1987.

California Energy Commission (CEC) 1986. 1986 Electricity Report.

California Transportation (Caltrans) 1986. Road Inventory.

California Methanol Task Force. The Distribution and Retailing of Fuel Methanol in the South Coast Air Basin 1987). Energy and Environmental Analysis, Inc. February 1987.

Code of Federal Regulations (CFR), Title 29. 1986

Code of Federal Regulations (CFR), Title 40. 1986

Code of Federal Regulations (CFR), Title 49. 1986

Cooper, John. Geologic Excursions in the Transverse Ranges (Volume and Guidebook). April, 1982.

Cornish, H. H. Solvents and Vapors. in Cassarett and Doull's Toxicology The Basic Science of Poisons (Second Ed.). Doull, J., C. D. Klaasen, & M. O. Amdur (eds.). Macmillan Publishing Co., Inc., New York. 1980.

Davis, R.K., L.V. Urban, and G.S. Stacy. 1977. Environmental Impact Analysis: A New Dimension in Decision Making, p. 181. Van Nostrand Reinhold Co., New York, New York, 1977.

DeLuchi, Mark, D. Sperling and R. Johnson. 1987. A Comparative Analysis of Future Transportation Fuels.

University of California at Berkeley. October, 1987.

D'Eliscu, P.N. 1987. A Compilation of Work Performed by Dr. Peter N. D'Eliscu on the Environmental Consequences of Methanol Spills. Compiled by Acurex Corp. 1987.

Denny, Jr., R.J., M.L. Hickok and D.W. Burhen (eds.). 1988. California's Environmental Handbook, Second Edition. Government Institutes, Inc., Rockville, Maryland. January 1988.

Department of Energy (DOE). 1982. Assessment of Methane-Related Fuels For Automotive Fleet Vehicles; Technical Supply and Economic Assessment. 1982.

Department of Transportation (DOT). 1984. Hazardous Materials Emergency Response Guidebook, 1984.

Department of Water and Power (Los Angeles). Los Angeles Department of Water and Power 1986-1987 Annual Report. October, 1987.

Donley, M. et al. Atlas of California. Pacific Book Center: Culver City, CA. 1979.

Duggger, M. Air Pollution Effects on Plant Growth. American Chemical Society: Washington, D.C. 1974.

Durrenberger, R. and R. Johnson. California Patterns on the Land. Mayfield Publishing Co.: Palo Alto, CA. 1976.

REFERENCES CITED

Ernst, W. ed. The Geotectonic Development of California.

Fay, J. ed. California Almanac: 1986-1987 Edition. Presidio Press and Pacific Data Resources: Sacramento, CA. 1985.

Groups for the Advancement of Psychiatry. 1982. Jobless - A Psychiatric Perspective. Mental Health Materials Center, New York. 1982.

Kunyz, K. Metropolitan Water District (MWD). 1988. Telephone conversation between K. Kunyz and R. Kniesel. July 1988.

Naegele, J. Air Pollution Damage to Vegetation. American Chemical Society: Washington, D.C. 1973.

Los Angeles County Transportation Commission. On the Road to the Year 2000. August, 1987.

Occupational Safety and Health Administration. 1978. Occupational Health Guideline for Ammonia. September 1978.

Penrod, Steven, 1987. The Effects of Unemployment. Social Psychology. 1987.

Sharp, Robert. Field Guide Coastal Southern California. Kendall/Hunt Publishing: Iowa. 1978.

Shore, D. E., & G. E. Bemis. Utilization of Methanol as Fuel for a Gas Turbine Cogeneration Plant. Proceedings: 1985 Symposium on Stationary Combustion NOx Control V. 2: Industrial Processes, Fundamental Studies, and Slagging Combustors. Electric Power Research Institute. January 1986.

Smith, W. Air Pollution and Forests: Interactions between Air Contaminants and Forest Ecosystems. Springer-Verlag: New York. 1981.

South Coast Air Quality Management District (SCAQMD). 1981. A Climatological/Air Quality Profile California South Coast Air Basin. 2nd Printing, December, 1981.

South Coast Air Quality Management District (SCAQMD). 1985a. Final Revision to the Federal Nitrogen Dioxide Attainment Strategy of the Air Quality Management Plan for the South Coast Air Basin. September 1985.

South Coast Air Quality Management District (SCAQMD). 1985B. Air Quality Trends in the South Coast Air Basin 1975 - 1984. August 1985.

South Coast Air Quality Management District (SCAQMD). 1986a. 1985 Summary of Air Quality in California's South Coast Air Basin. December 1986.

South Coast Air Quality Management District (SCAQMD). 1986B. Cogeneration and Resource Recovery Handbook. September, 1986.

South Coast Air Quality Management District (SCAQMD). Air Quality Data. 1987.

South Coast Air Quality Management District (SCAQMD). 1987a. The Path to Clean Air: Attainment Strategies. 1987.

South Coast Air Quality Management District (SCAQMD). 1987b. Air Quality Handbook For Preparing Environmental Impact Reports, Revised April 1987.

South Coast Air Quality Management District (SCAQMD) and Southern California Association of Governments (SCAG). 1987. Reasonable Further Progress Report for 1986 on the Implementation of the 1982 Air Quality Management Plan Revision. December 1987.

South Coast Air Quality Management District (SCAQMD). 1988. Draft Final Environmental Impact Report of Proposed District Rule 1134, Control of Oxides of Nitrogen from Stationary Gas Turbines. March 1988.

Southern California Association of Governments (SCAG). 1987. Draft Baseline Projection. February 1987.

Southern California Association of Governments (SCAG). 1988a. Draft Regional Housing Needs Assessment, April 7, 1988.

Southern California Association of Governments (SCAG). 1988 Regional Mobility Plan Draft Environmental Impact Report. 1988.

Southern California Association of Governments (SCAG). 1988b. Preliminary Draft Growth Management Plan, April 8, 1988.

REFERENCES CITED

Southern California Association of Governments (SCAG). 1988 Growth Management Plan. 1988.

Southern California Association of Governments (SCAG). 1988c. Waste-By-Rail-Study. 1988.

Statewide Technical Review Group. Technical Support Document for Suggested Control Measure for the Control of Emissions of NO_x from Industrial, Institutional, and commercial Boilers Steam Generators and Process Heaters. March, 1987.

Western Liquid Gas Association. Unified Petroleum Gas As An Alternative Transportation Fuel. June, 1988.

United States Army Corps of Engineers. California Water Resources Development. 1977.

United States Department of Energy. Assessment of Methane-Related Fuels for Automotive Fleet Vehicles. (Appendices) February 1982.

Water Advisory Committee of Orange County. Water Development in Orange County: Past, Present and Future. July, 1987.

APPENDIX A

NOTICE OF PREPARATION



South Coast
AIR QUALITY MANAGEMENT DISTRICT
9150 FLAIR DRIVE, EL MONTE, CA 91731 (818) 572-6200

January 20, 1988

NOTICE OF PREPARATION

TO: FROM: South Coast Air Quality
Management District
9150 Flair Drive
El Monte, CA 91731

SUBJECT: Notice of Preparation of a Draft Environmental Impact
Report on the Air Quality Management Plan Revision

The South Coast Air Quality Management District will be the Lead Agency and will prepare an environmental impact report for the Revision to the Air Quality Management Plan. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR when considering decisions affecting air quality.

The project description, and the probable environmental effects, are contained in the attached materials. A copy of the Initial Study is attached.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date, but no later than 30 days after receipt of this notice. Please send your response to Brian Farris at the address shown above. We will need the name for a contact person in your agency.

A public scoping session on the proposed EIR for the Air Quality Management Plan Revision will be held in accordance with the provisions of the California Environmental Quality Act. This meeting is scheduled as follows:

Date: Monday, February 22, 1988
Time: 9:00 a.m. to noon
Place: McCandless Auditorium
SCAQMD Headquarters
9150 Flair Dr.
El Monte, CA 91731

NOTICE OF PREPARATION
(continued)

Public and agency comments and recommendations in the scope and content of the EIR will be accepted at the meeting.

A handwritten signature in black ink, appearing to read "Brian W. Farris". The signature is fluid and cursive, with the first name "Brian" being more prominent than the last name "Farris".

Brian W. Farris
Sr. Air Quality Specialist
Planning Division
(818) 572-2152

AIR QUALITY MANAGEMENT PLAN REVISION
INITIAL STUDY

PROJECT DESCRIPTION

Emission Reduction Objectives

The revised Air Quality Management Plan (AQMP) will contain strategies designed to meet the federal ambient air quality standards by the year 2007 in the South Coast Air Basin. The following table shows the projected baseline air emissions growth from 1985-2007, and the required emission reductions needed to meet the federal standards.

TABLE I

EMISSION REDUCTIONS REQUIRED
TO MEET STANDARDS
(Rounded to Nearest 10 tons per day [t/d])

Pollutant	Baseline Emissions 2007,t/d	Component of Emissions Due to Growth 1985-2007,t/d	Allowable Emissions to Meet Federal Standards,t/d	Additional Emissions Reductions Beyond Baseline to Meet Federal Standards in 2007,t/d
ROG	1010	240	250	760
NOx	910	270	470*	440*
SOx	180	40	40*	140*
CO	3280	1030	2100	1180
PM ₁₀	1130	350	500	630

*Reflects emission reductions beyond those needed to meet NO₂ and SO₂ standards; these reductions are needed to meet the PM₁₀ standards.

Emission Reduction Strategies

Three tiers of strategies will be necessary to meet the emission reduction objectives of the AQMP. These tiers are organized according to increasing level of difficulty in implementation and, in Tier Three, are dependent on technological breakthroughs. These tiers are shown in the following sections:

Tier One - Full Scale Implementation of Known Technology.

Tier One strategies are an aggressive implementation of known technologies in a traditional regulatory approach. Implementation of all these measures can begin within five years of plan adoption.

TABLE II
TIER ONE - CURRENTLY AVAILABLE CONTROL STRATEGIES

Activity Category	Key Control Approaches
Passenger Vehicles	Improved Inspection/Maintenance Expanded certification procedures Tightened vehicle emissions standards Use of methanol and electric-powered vehicles Trip reduction programs Traffic flow improvements
Freight Vehicles	Use of newer, less polluting engines Institution of Inspection/Maintenance program Use of methanol or other clean fuels Transportation System Management Stricter diesel fuel standards
Residential/ Recreational	Reductions in use of photochemically reactive consumer solvents Controls on off-road vehicles Controls on powered equipment Use of water-borne paints and coatings
Other Mobile/Farming	Changes farming practices Controls on construction equipment Controls on aircraft, ships, and trains
Manufacturing	Clean fuel substitution Expanded controls on degreasing operations Controls on aircraft, ships, and trains
Manufacturing	Clean fuel substitution Expanded controls on degreasing operations Controls on type or use of surface coatings Elimination of exemptions
Petroleum Production and Marketing	Electrification of oil production Stricter controls on operations Substitution of gasoline vehicles with clean-fuel vehicles Lowering of gasoline volatility
Electric Power Production	Selective Catalytic Reduction (SCR) Process modification Alternative methods of production Greater use of out-of-Basin production
Service/Commerce/ Other	Substitution of electric motors Controls on restaurant charbroiling Use of dry-to-dry cleaning machines Eliminating exemptions Controls on large bakery ovens

It is estimated that Tier One strategies could reduce emissions below baseline between now and the year 2007 by the following amounts: ROG, 340 tons/day; NOx, 400 tons/day; SOx, 70 tons/day; PM₁₀, 320 tons/day, and CO, 1500 tons/day.

Tier Two - Advancement of Known Technology

Tier One strategies will bring the Basin toward attainment, but additional strategies will be needed to further reduce emissions. The following Tier Two strategies will not require technological breakthroughs but will, in some cases, require new technological applications not currently on the market.

More importantly, the new technological applications will require more widespread usage than the regulations have required to date. Tier Two emission reduction strategies, including transportation measures, will require a strong public commitment. These strategies are shown in the following table:

TABLE III
TIER TWO-STRATEGIES INVOLVING
ADVANCEMENT OF KNOWN TECHNOLOGY

Activity Category	Key Control Approaches
Passenger Vehicles	Transportation Control Measures to keep travel at current level 40% penetration of clean fuel vehicles
Freight Vehicles	70% penetration of clean fuels Freight forwarding and other distribution improvements Greater reliance on rail transport
Residential/ Recreational	Low emission building codes Emission fees for new housing units Further reductions in use of photochemically reactive consumer products Further off-road vehicle regulation
Manufacturing	Offset program to ensure no growth in emissions Coating application by robotics, ultraviolet curable coatings, and catalytic curable coatings Fuel cells Emission fees
Petroleum Production	Export tax or similar measure to discourage transport of District-refined petroleum products outside of Southern California

Tier Two strategies can result in estimated additional emission reductions of 240 tons/day of ROG, 60 tons/day of NOx, 50 tons/day of SOx, 370 tons/day of PM₁₀ and 460 tons/day of carbon monoxide. The application of Tier Two controls, when combined with the Tier One strategies, will result in the necessary reductions in all pollutants except ROG. In order to meet the ozone standard, ROG must still be reduced by an estimated 180 tons/day within the next 20 years (from 430 tons/day of the remaining inventory to 250 tons/day).

Tier Three - Technological Breakthroughs Required

Actions necessary to attain the remaining ROG reductions required to meet the ozone standard exceed current known technologies, even in the most aggressive applications. Tier Three efforts are intended to achieve these reductions and may provide a means to reduce some of the impacts of Tier Two strategies.

The Tier Three approach requires major technological advancements or massive investments in infrastructure. These strategies, shown on Table IV, rely on new technologies such as superconductors and electrical storage devices, and the building of new, or elimination of existing, infrastructures.

TABLE IV
TIER THREE STRATEGIES
AND ASSOCIATED EMISSION REDUCTION POTENTIAL

<u>Strategy</u>	<u>MAXIMUM REDUCTION BELOW BASELINE EMISSIONS IN YEAR 2007, TONS/DAY</u>				
	<u>ROG</u>	<u>NOx</u>	<u>SOx</u>	<u>PM₁₀</u>	<u>CO</u>
a. Full electrification of all motor vehicles and stationary combustion sources.	160	320	40	35	1760
b. Elimination of ROG from solvent and surface coatings where no substitute materials are now known.	450	-	-	-	-
c. Abatement of remaining dust generation by 75 percent.	-	-	-	700	-

ENVIRONMENTAL CHECKLIST FORM

I. Background

1. Name of Proponent: South Coast Air Quality Management District
2. Address and Phone Number of Proponent: 9150 Flair Dr.
El Monte, CA 91731 818/572-2152
3. Date of Checklist Submission: _____
4. Agency Requiring Checklist: South Coast Air Quality Management District
5. Name of Proposal, if applicable: Air Quality Management Plan Revision

I. Environmental Impacts

(Explanations of all "yes" and "maybe" answers are required on attached sheets.)

	YES	MAYBE	NO
1: <u>Earth</u> . Will the proposal result in:			
a. Unstable earth conditions or in changes in geologic substructures.	_____	_____	<u>X</u>
b. Disruptions, displacements, compaction or overcovering of the soil?	_____	_____	<u>X</u>
c. Change in topography or ground surface relief features?	_____	_____	<u>X</u>
d. The destruction, covering or modification of any unique geologic or physical features?	_____	_____	<u>X</u>
e. Any increase in wind or water erosion of soils, either on or off the site?	_____	_____	<u>X</u>
f. Changes in deposition or erosion of beach sands, or changes in siltation, deposition or erosion which may modify the channel of a river or stream or the bed of the ocean or any bay, inlet or lake?	_____	_____	<u>X</u>

	YES	MAYBE	NO
g. Exposure of people or property to geological hazards such as earthquakes, landslides, mudslides, ground failure, or similar hazards.	_____	_____	<u> X </u>
2: <u>Air</u> : Will the proposal result in:			
a. Substantial air emissions or deterioration of ambient air quality?	_____	<u> X </u>	_____
b. The creation of objectionable odors?	_____	_____	<u> X </u>
c. Alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally	_____	_____	<u> X </u>
3. <u>Water</u> : Will the proposal result in:			
a. Changes in currents, or the course or direction of water movements, in either marine or fresh waters?	_____	_____	<u> X </u>
b. Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff?	_____	<u> X </u>	_____
c. Alterations to the course of flow of flood waters.	_____	_____	<u> X </u>
d. Change in the amount of surface water in any water body.	_____	_____	<u> X </u>
e. Discharge into surface waters or in any alteration of surface water quality, including but not limited to temperature, dissolved oxygen or turbidity?	_____	<u> X </u>	_____
f. Alteration of the direction or rate of flow of ground waters?	_____	_____	<u> X </u>
g. Change in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?	_____	_____	<u> X </u>
h. Substantial reduction in the amount of water otherwise available for public water supplies?	_____	_____	<u> X </u>
i. Exposure of people or property to water related hazards such as flooding or tidal waves?	_____	_____	<u> X </u>

	YES	MAYBE	NO
4. <u>Plant Life</u> : Will the proposal result in:			
a. Change in the diversity of species or number of any species of plants (including trees, shrubs, grasses, crops, and aquatic plants)?	_____	<u>X</u>	_____
b. Reduction of the numbers of any unique, rare or endangered species of plants?	_____	<u>X</u>	_____
c. Introduction of new species of plants into an area, or in a barrier to the normal replenishment of existing species?	_____	<u>X</u>	_____
d. Reduction in acreage of any agricultural crop?	_____	<u>X</u>	_____
5. <u>Animal Life</u> : Will the proposal result in:			
a. Change in the diversity of species, or numbers of any species of animals (birds, land animals including reptiles, fish and shellfish, benthic organisms, or insects)?	_____	<u>X</u>	_____
b. Reduction of the numbers of any rare or endangered species of animals?	_____	<u>X</u>	_____
c. Introduction of new species of animals into an area, or result in a barrier to the migration or movement of animals?	_____	<u>X</u>	_____
d. Deterioration to existing fish or wildlife habitat?	_____	<u>X</u>	_____
6. <u>Noise</u> : Will the proposal result in:			
a. Increases in existing noise levels?	_____	<u>X</u>	_____
b. Exposure of people to severe noise levels?	_____	<u>X</u>	_____
7. <u>Light and Glare</u> : Will the proposal produce new light or glare?	_____	<u>X</u>	_____
8. <u>Land Use</u> : Will the proposal result in a substantial alteration of the present or planned land use of an area?	<u>X</u>	_____	_____

	YES	MAYBE	NO
9. <u>Natural Resources:</u> Will the proposal result in:			
a. Increase in the rate of use of any natural resources?	<u>X</u>	<u> </u>	<u> </u>
b. Substantial depletion of any non-renewable natural resource?	<u> </u>	<u>X</u>	<u> </u>
10. <u>Risk of Upset:</u> Does the proposal involve a risk of an explosion or the release of hazardous substances (including, but not limited to: oil, pesticides, chemicals or radiation) in the event of an accident or upset conditions?	<u> </u>	<u>X</u>	<u> </u>
11. <u>Population:</u> Will the proposal alter the location, distribution, density, or growth rate of the human population of an area?	<u>X</u>	<u> </u>	<u> </u>
12. <u>Housing:</u> Will the proposal affect existing housing, or create a demand for additional housing?	<u>X</u>	<u> </u>	<u> </u>
13. <u>Transportation/Circulation:</u> Will the proposal result in:			
a. Generation of substantial additional vehicular movement?	<u> </u>	<u> </u>	<u>X</u>
b. Effects on existing parking facilities or demand for new parking?	<u> </u>	<u> </u>	<u>X</u>
c. Substantial impact upon existing transportation systems?	<u>X</u>	<u> </u>	<u> </u>
d. Alterations to present patterns of circulation or movement of people and/or goods?	<u>X</u>	<u> </u>	<u> </u>
e. Alterations to waterborne, rail or air traffic?	<u>X</u>	<u> </u>	<u> </u>
f. Increase in traffic hazardous to motor vehicles, bicyclists or pedestrians?	<u> </u>	<u> </u>	<u>X</u>
14. <u>Public Services:</u> Will the proposal have an effect upon, or result in a need for new or altered governmental services in any of the following areas:	<u> </u>	<u> </u>	<u> </u>

	Yes	MAYBE	NO
a. Fire protection?	<u> </u>	<u> X </u>	<u> </u>
b. Police protection?	<u> </u>	<u> </u>	<u> X </u>
c. Schools?	<u> </u>	<u> </u>	<u> X </u>
d. Parks or other recreational facilities?	<u> </u>	<u> X </u>	<u> </u>
e. Maintenance of public facilities, including roads?	<u> X </u>	<u> </u>	<u> </u>
f. Other governmental services?	<u> X </u>	<u> </u>	<u> </u>
15. <u>Energy</u> : Will the proposal result in:			
a. Use of substantial amounts of fuel or energy?	<u> X </u>	<u> </u>	<u> </u>
b. Substantial increase in demand upon existing sources of energy, or require the development of new sources of energy?	<u> X </u>	<u> </u>	<u> </u>
16. <u>Utilities</u> : will the proposal result in a need for new systems, or substantial alterations to the following utilities:			
a. Power or natural gas?	<u> X </u>	<u> </u>	<u> </u>
b. Communications systems?	<u> X </u>	<u> </u>	<u> </u>
c. Water?	<u> </u>	<u> X </u>	<u> </u>
d. Sewer or septic tanks?	<u> </u>	<u> </u>	<u> X </u>
e. Storm water drainage?	<u> </u>	<u> X </u>	<u> </u>
f. Solid waste and disposal?	<u> X </u>	<u> </u>	<u> </u>
17. <u>Human Health</u> : Will the proposal result in:			
a. Creation of any health hazard or potential health hazard (excluding mental health)?	<u> </u>	<u> X </u>	<u> </u>
b. Exposure of people to potential health hazards?	<u> </u>	<u> X </u>	<u> </u>
18. <u>Aesthetics</u> : Will the proposal result in the obstruction of any scenic vista or view open to the public, or will the proposal result in the creation of an aesthetically offensive site open to public view?	<u> </u>	<u> </u>	<u> X </u>

	YES	MAYBE	NO
19. <u>Recreation</u> : Will the proposal result in an impact upon the quality or quantity of existing recreational opportunities?	_____	<u> X </u>	_____
20. <u>Archeological/Historical</u> : Will the proposal result in an alteration of a significant archeological or historical site, structure, object or building?	_____	_____	<u> X </u>
21. <u>Mandatory Findings of Significance</u> :			
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	<u> X </u>	_____	_____
b. Does the project have the potential to achieve short-term, to the disadvantage of long-term environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief definitive period of time while long-term impacts will endure well into the future.)	_____	_____	<u> X </u>
c. Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant).	<u> X </u>	_____	_____
d. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	_____	<u> X </u>	_____

III. Determination

On the basis of this initial evaluation:

_____ I find the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

_____ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A NEGATIVE DECLARATION WILL BE PREPARED.

 X I find the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

Date: 1/20/88


(Signature)

For: South Coast Air Quality
Management District

DISCUSSION OF ENVIRONMENTAL IMPACTS

2. Air

Emission controls, alternate energy sources and solvent substitutions may cause changes in emission characteristics. These changes need analysis and possible mitigation.

3. Water

Water use or discharges from pollution control systems, infrastructure modifications, or solvent substitutions may cause impacts requiring mitigation.

More frequent street washing to control particulate matter emissions could impact surface runoff rates and water quality.

4. Plant Life; 5. Animal Life; 6. Noise; 7. Light and Glare

The AQMP impact analysis will use the latest available population and land use forecasts from the Southern California Association of Governments. AQMP implementation may impact and modify planned future growth patterns. These unplanned changes may, in turn, adversely impact the above items in terms of changes or reductions in open space, increased population densities, and concomitant increases in noise, light and glare.

8. Land Use

Changes in building codes, emissions fees, transportation related measures, and infrastructures will probably affect current and future land use patterns.

9. Natural Resources

Natural resource use, primarily energy, will change and some demands may increase due to changes in industrial equipment, production controls, substitute solvents, changed fuel types, and large scale industrial and transportation equipment electrification.

10. Risk of Upset

Ammonia used in SCR, possible substitute solvents or other new control technologies or reagents may be accidentally released under upset conditions.

11. Population

Potential population changes will probably be related to land use and transportation changes. Population is forecast to grow dramatically, but not as a result of this project. Distribution patterns could be altered as a result of plan implementation.

12. Housing

Low emission building codes and new emission fees may increase costs, change population patterns, housing types, and densities.

13. Transportation

Significant transportation measures in the AQMP relating to vehicle flow, vehicle miles travelled, fuels, vehicle types, and freight movement will affect all forms of land, air, and water-borne transportation. Transportation patterns will be altered to meet the Plan's objectives with consequent, potentially significant, impacts.

14. Public Services

Changes in emissions controls, land use, vehicular movements and infrastructure will create new and different demands on essential public services.

15. Energy

Changes in energy use, especially in the substitution of clean fuels and electrification, will cause the development of new energy sources, with consequent impacts.

16. Utilities

Changes in the utilities infrastructure are expected, resulting from energy changes, transportation measures, land use changes, and potential waste disposal requirements of pollution control equipment.

17. Human Health

The public may be exposed to toxic hazards from pollution control equipment, solvent substitution, new fuels, or infrastructure modifications.

19. Recreation

Recreational opportunities may be impacted by changes in population densities, open space or transportation brought about by the plan. Again, the AQMP is not a population growth plan, but may affect urban land use patterns.

21. Mandatory Findings of Significance

The project has the potential to degrade the quality of the environment by possibly causing changes in certain air contaminants; modifying planned land uses; consuming natural resources, creating a risk of upset; affecting surface water quality; and causing increased energy use.

Many of these impacts are individually limited but cumulatively considerable. This will hold true for impacts to the same environmental media (such as additive air impacts) and cross-media impacts (such as impacts on land use caused by transportation control measures to reduce air emissions).

The indicated significant environmental impacts could have adverse human health impacts either through individual impacts (such as possible toxic releases from emission control equipment) or cumulatively if the impacts on different environmental media reinforce each other. These effects could be either direct or indirect.

Economics

Economic impacts do not appear on the checklist form, but will be analyzed for their potential impacts. Adverse economic impacts may lead to physical impacts on the region. These impacts may result from population or industrial activity changes caused by the economic consequences of the strategies. These changes may modify the region's economic base, which may have physical environmental implications.

EFFECTS FOUND NOT TO BE SIGNIFICANT

The following areas were determined to not have the potential to be significantly impacted by the AQMP.

1. Earth

The project itself, or its secondary impacts, does not appear to have the potential to impact earth resources. Those changes to the earth that will be caused by land use actions are only very indirectly related to the plan. The plan will tend to cause increases in land use intensities and reduce pressures to urbanize non-urban land.

18. Aesthetics

Plan implementation is expected to improve aesthetics by improving visibility through reducing air emissions.

20. Archeological/Historical

The plan and its direct or indirect impacts are not expected to impact heritage resources. Induced changes in urbanization patterns may have some impacts, but these are unforeseeable at this time. Potential impacts may not be significant given protections currently in place for these resources.

POTENTIAL ENVIRONMENTAL BENEFITS OF THE PROJECT

The AQMP is designed to provide for strategies to meet the federal ambient air quality standards within twenty years. Therefore, it can be expected to have environmental benefits as well as potential impacts. These benefits will not be examined in the Draft EIR, but are briefly listed below.

- o Air quality improvement, which will result in improvements to:
 - Public Health
 - Longevity of materials
 - Agriculture and plant life
 - Aesthetics, especially visibility
- o More efficient land use patterns and transportation systems.
- o More efficient use of natural resources and energy.
- o Significant progress toward the attainment of state ambient air quality standards.

APPENDIX B

MAILING LIST OF PERSONS AND ORGANIZATIONS RECEIVING DEIR

GOVERNMENT LIST LOS ANGELES COUNTY

BUREAU OF PLANNING, COMM.& ENVIRON.
333 W. OCEAN BLVD, 4TH FLOOR
LONG BEACH, CA 90802

CITY ADMINISTRATIVE OFFICER
CITY HALL EAST, ROOM 300
200 N. MAIN ST.
LOS ANGELES, CA 90729

CITY OF BELL
COMMUNITY SERVICES DIRECTOR
6330 PINE AVE.
BELL, CA 90201

CITY OF BELL GARDENS
DIRECTOR OF COMMUNITY DEVELOPMENT
7100 S. GARFIELD AVE.
BELL GARDENS, CA 90201

CITY OF BELLFLOWER
DIRECTOR OF PLANNING
16600 CIVIC CENTER DRIVE
BELLFLOWER, CA 90706

CITY OF BEVERLY HILLS
DIRECTOR OF PLANNING
450 NORTH CRESCENT DRIVE
BEVERLY HILLS, CA 90210

CITY OF BRADBURY
CITY MANAGER
600 WINSTON AVE.
BRADBURY, CA 91010

CITY OF BURBANK
PUBLIC SERVICE DEPARTMENT
164 W. MAGNOLIA BLVD.
P.O. BOX 631
BURBANK, CA 91503

CITY OF CARSON
COMMUNITY DEVELOPMENT DIRECTOR
P.O. BOX 6234
CARSON, CA 90749

CITY OF CERRITOS
DIRECTOR, ENVIRONMENTAL AFFAIRS
BLOOMFIELD AVE. AT 183RD ST.
CERRITOS, CA 90701

CITY OF CLAREMONT
P.O. BOX 880
CLAREMONT, CA 91711

CITY OF CLAREMONT
207 HARVARD AVENUE
CLAREMONT, CA 91711

CITY OF COMMERCE
DIRECTOR OF COMMUNITY DEVELOPMENT
2535 COMMERCE WAY
COMMERCE, CA 90040

CITY OF COMPTON
PLANNING DIRECTOR
205 E. WILLOWBROOK AVENUE
COMPTON, CA 90220

CITY OF COVINA
PLANNING DIRECTOR
125 E. COLLEGE STREET
COVINA, CA 91723

CITY OF CUDAHY
DIRECTOR OF COMMUNITY DEVELOPMENT
5220 SANTA ANA STREET
CUDAHY, CA 90201

CITY OF CYPRESS
PLANNING DIRECTOR
5257 ORANGE AVE.
CYPRESS, CA 90630

CITY OF DOWNEY
COMMUNITY DEVELOPMENT DIRECTOR
11111 BROOKSHIRE AVE.
DOWNEY, CA 90241

CITY OF DUARTE
DIRECTOR OF PLANNING AND
1600 HUNTINGTON DRIVE
DUARTE, CA 91010

CITY OF EL MONTE
DIRECTOR OF PLANNING
11333 VALLEY BLVD
EL MONTE, CA 91734

CITY OF EL SEGUNDO
PLANNING DIRECTOR
350 MAIN STREET
EL SEGUNDO, CA 90245

CITY OF GARDENA
COMUNITY DEVELOPMENT DIRECTOR
1700 W. 162ND ST.
GARDENA, CA 90247

CITY OF GLENDALE
DIRECTOR OF PLANNING
633 E. BROADWAY, ROOM 104
GLENDALE, CA 91205

CITY OF GLENDORA
DIRECTOR OF PLANNING & REDEVELOPMENT
116 E. FOOTHILL BLVD.
GLENDORA, CA 91740

CITY OF HAWAIIAN GARDENS
CITY ADMINISTRATOR
21815 S. PIONEER BLVD.
HAWAIIAN GARDENS, CA 90716

CITY OF HERMOSA BEACH
PLANNING DIRECTOR
1315 VALLEY DRIVE
HERMOSA BEACH, CA 90254

CITY OF HIDDEN HILLS
PLANNING DIRECTOR
24549 LONG VALLEY ROAD
HIDDEN HILLS, CA 91302

CITY OF HUNTINGTON PARK
COMMUNITY DEVELOPMENT DIRECTOR
6550 MILES AVE.
HUNTINGTON PARK, CA 90255

CITY OF INDUSTRY
CITY MANAGER
15651 E. STAFFORD STREET
INDUSTRY, CA 91744

CITY OF INGLEWOOD
DIRECTOR OF PLANNING & DEVELOPMENT
ONE MANCHESTER BLVD.
INGLEWOOD, CA 90301

CITY OF IRWINDALE
CITY MANAGER
5050 N. IRWINDALE AVE.
IRWINDALE, CA 91706

CITY OF LA CANADA-FLINTRIDGE
PLANNING DIRECTOR
1327 FOOTHILL BLVD.
LA CANADA-FLINTRIDGE, CA 91011

CITY OF LA HABRA
DIRECTOR OF PLANNING
201 EAST LA HABRA ROAD
LA HABRA, CA 90631

CITY OF LA HABRA
DIRECTOR OF PLANNING
201 EAST LA HABRA ROAD
LA HABRA, CA 90631

CITY OF LA HABRA HEIGHTS
PLANNING COMMISSION SECRETARY
1245 N. HACIENDA BLVD.
LA HABRA HEIGHTS, CA 90631

CITY OF LA HABRA HEIGHTS
PLANNING COMMISSION SECRETARY
1245 N. HACIENDA BLVD.
LA HABRA HEIGHTS, CA 90631

CITY OF LA MIRADA
PLANNING DIRECTOR
13700 LA MIRADA BLVD.
LA MIRADA, CA 90638

CITY OF LA PUENTE
DIRECTOR OF COMMUNITY DEV.
15900 E. MAIN STREET
LA PUENTE, CA 91744

CITY OF LA VERNE
PLANNING DIRECTOR
3660 "D" STREET
LA VERNE, CA 91750

CITY OF LAKEWOOD
DIRECTOR OF COMMUNITY DEV.
5050 N. CLARK AVENUE
LAKEWOOD, CA 90712

CITY OF LANCASTER
DIRECTOR OF COMMUNITY DEV.
44933 N. FERN AVENUE
LANCASTER, CA 93534

CITY OF LAWDALE
PLANNING DIRECTOR
14717 BURIN AVE.
LAWDALE, CA 92060

CITY OF LOMITA
CITY ADMINISTRATOR
24300 NORBONNE AVE.
LOMITA, CA 90717

CITY OF LONG BEACH
DIRECTOR OF PLANNING & BUILDING
333 WEST OCEAN BLVD.
LONG BEACH, CA 90802

CITY OF LOS ANGELES
DEPT. OF WORKS
200 N. SPRING STREET, ROOM 807
LOS ANGELES, CA 90012

CITY OF LOS ANGELES
DEPT. OF PUBLIC WORKS
CITY HALL, ROOM 810
LOS ANGELES, CA 90012

CITY OF LYNWOOD
COMMUNITY DEVELOPMENT DIRECTOR
11330 BULLIS ROAD
LYNWOOD, CA 90262

CITY OF MANHATTAN BEACH
DIRECTOR OF COMMUNITY DEVELOPMENT
1400 HIGHLAND AVE.
MANHATTAN BEACH, CA 90266

CITY OF MAYWOOD
DIRECTOR OF BUILDING/PLANNING
4319 EAST SLAUSON AVE.
MAYWOOD, CA 90270

CITY OF MONROVIA
DIRECTOR OF BUILDING & PLANNING
415 S. IVY AVE.
MONROVIA, CA 91016

CITY OF MONTEBELLO
CITY PLANNER
1600 W. BEVERLY BLVD.
MONTEBELLO, CA 90640

CITY OF MONTEREY PARK
COMMUNITY DEVELOPMENT DIRECTOR
320 WEST NEWMARK AVE.
MONTEREY PARK, CA 91754

CITY OF NORWALK
DIRECTOR OF PLANNING & DEVELOPMENT
12700 NORWALK BLVD.
NORWALK, CA 90650

CITY OF PALMDALE
PRINCIPAL PLANNER
708 E. PALMDALE BLVD.
PALMDALE, CA 93550

CITY OF PALOS VERDES ESTATES
DIRECTOR OF PUBLIC WORKS
340 PALOS VERDES DRIVE WEST
PALOS VERDES ESTATES, CA 90274

CITY OF PARAMOUNT
COMMUNITY DEVELOPMENT DIRECTOR
16400 COLORADO AVE.
PARAMOUNT, CA 90723

CITY OF PASADENA
DIRECTOR OF HOUSING AND
COMMUNITY DEVELOPMENT
100 NORTH GARFIELD AVE.
PASADENA, CA 91109

CITY OF PICO RIVERA
DIRECTOR OF PLANNING
6615 PASSONS BLVD.
PICO RIVERA, CA 90660

CITY OF POMONA
DIRECTOR OF COMMUNITY DEVELOPMENT
505 S. GAREY AVE.
POMONA, CA 91766

CITY OF RANCHO PALOS VERDES
PLANNING DIRECTOR
80940 HAWTHORNE BLVD.
RANCHO PALOS VERDES, CA 90274

CITY OF REDONDO BEACH
DIRECTOR OF PLANNING
415 DIAMOND STREET
REDONDO BEACH, CA 90277

CITY OF ROLLING HILLS
CITY MANAGER/CITY CLERK
TWO PORTUGUESE BEND ROAD
ROLLING HILLS, CA 90274

CITY OF ROLLING HILLS ESTATES
PLANNING DIRECTOR
4045 PALOS VERDES DRIVE NORTH
ROLLING HILLS ESTATES, CA 90274

CITY OF ROSEMEAD
DIRECTOR OF PLANNING
3838 VALLEY BLVD.
ROSEMEAD, CA 91770

CITY OF SAN DIMAS
DIRECTOR OF COMMUNITY DEVELOPMENT
245 E. BONITA AVE.
SAN DIMAS, CA 91773

CITY OF SAN FERNANDO
DIRECTOR OF PLANNING
117 MACNEIL STREET
SAN FERNANDO, CA 91340

CITY OF SAN GABRIEL
DIRECTOR OF PUBLIC WORKS
532 W. MISSION DRIVE
SAN GABRIEL, CA 91776

CITY OF SAN MARINO
CITY ENGINEER
2200 HUNTINGTON DRIVE
SAN MARINO, CA 91108

CITY OF SANTA FE SPRINGS
DIRECTOR OF PLANNING
11710 TELEGRAPH ROAD
SANTA FE SPRINGS, CA 90670

CITY OF SANTA MONICA
DIRECTOR. OF COMMUN. & ECON. DEV.
1685 MAIN STREET
SANTA MONICA, CA 90401-3295

CITY OF SIERRA MADRE
CITY ADMINISTRATOR
232 W. SIERRA MADRE BLVD.
SIERRA MADRE, CA 91024

CITY OF SIGNAL HILL
DIR. OF PLAN. & COMMUN. DEV.
2175 CHERRY AVENUE
SIGNAL HILL, CA 90806

CITY OF SOUTH EL MONTE
DIR. OF PLAN. & COMMUN. DEV.
1415 S. SANTA ANITA AVENUE
SOUTH EL MONTE, CA 91733

CITY OF SOUTH GATE
DIRECTOR OF COMMUNITY DEVELOPMENT
3650 CALIFORNIA AVENUE
SOUTH GATE, CA 90280

CITY OF SOUTH PASADENA
CITY PLANNER
1414 MISSION STREET
SOUTH PASADENA, CA 91031

CITY OF THOUSAND OAKS
CITY MANAGER
401 WEST HILLCREST DRIVE
THOUSAND OAKS, CA 91360

CITY OF TORRANCE
ENVIRON. QUALITY ADMIN.
3031 TORRANCE BLVD.
TORRANCE, CA 90509-2970

CITY OF VERNON
DIRECTOR OF COMMUNITY SERVICES
4305 SANTA FE AVE.
VERNON, CA 90058

CITY OF WALNUT
PLANNING DIRECTOR
21201 LA PUENTE ROAD
WALNUT, CA 91789

CITY OF WEST COVINA
PLANNING DIRECTOR
1444 W. GARVEY AVENUE
WEST COVINA, CA 91790

CITY OF WEST HOLLYWOOD
CITY MANAGER
8611 SANTA MONICA BLVD.
WEST HOLLYWOOD, CA 90060

CITY OF WESTLAKE VILLAGE
CITY MANAGER/CITY CLERK
31824 VILLAGE CENTER ROAD
WESTLAKE VILLAGE, CA 91361

CITY OF WHITTIER
PLANNING DIRECTOR
13230 E. PENN STREET
WHITTIER, CA 90602

COUNTY OF LOS ANGELES
PLANNING DIRECTOR
320 W. TEMPLE ST., 13TH FLOOR
LOS ANGELES, CA 90012

COUNTY OF LOS ANGELES
L.A. COUNTY CHIEF ADMIN. OFFICER
500 W. TEMPLE STREET, ROOM 713
LOS ANGELES, CA 90012

DIRECTOR OF PLANNING
CITY HALL, ROOM 561
200 N. SPRING STREET
LOS ANGELES, CA 90012

LA CITY SANITATION
200 N. MAIN STREET, ROOM 1410
LOS ANGELES, CA 90012

THE COMM. REDEVELOPMENT AGENCY OF LA
354 S. SPRING ST., SUITE 700
LOS ANGELES, CA 90013

GOVERNMENT LIST RIVERSIDE COUNTY

CITY OF BANNING
COMMUNITY DEVELOPMENT DIRECTOR
161 WEST RAMSEY STREET
BANNING, CA 92220

CITY OF BEAUMONT
PLANNING DIRECTOR
550 E. SIXTH STREET
BEAUMONT, CA 92223

CITY OF CATHEDRAL CITY
DIRECTOR OF COMMUNITY DEVELOPMENT
68-635 PEREZ RD.
CATHEDRAL CITY, CA 92234

CITY OF COACHELLA
CITY PLANNER
1515 6TH STREET
COACHELLA, CA 92236

CITY OF DESERT HOT SPRINGS
PLANNING DIRECTOR
11711 WEST DRIVE
DESERT HOT SPRINGS, CA 92240

CITY OF HEMET
DIRECTOR OF COMMUNITY DEV.
450 EAST LATHAM AVE.
HEMET, CA 92343

CITY OF INDIAN WELLS
CITY MANAGER
44-950 ELDORADO DRIVE
INDIAN WELLS, CA 92260

CITY OF INDIO
DIRECTOR OF PLANNING & DEVELOPMENT
100 CIVIC CENTER MALL
INDIO, CA 92201

CITY OF LA QUINTA
CITY MANAGER
78-105 CALLE ESTADO
LA QUINTA, CA 92253

CITY OF LAKE ELSINORE
COMMUNITY DEVELOPMENT DIR.
130 SOUTH MAIN STREET
LAKE ELSINORE, CA 92330

CITY OF MORENO VALLEY
DIRECTOR OF COMMUNITY DEVELOPMENT
12800 HEACOCK STREET
MORENO VALLEY, CA 92388

CITY OF PALM DESERT
DIRECTOR OF ENVIRONMENTAL SERVICES
73-510 FRED WARING DRIVE
PALM DESERT, CA 92260

CITY OF PALM SPRINGS
DIRECTOR OF COMMUNITY DEVELOPMENT
3200 TAHQUITZ-MCCALLUM WAY
PALM SPRINGS, CA 92262

CITY OF PERRIS
CITY MANAGER
101 NORTH "D" STREET
PERRIS, CA 92370

CITY OF RANCHO MIRAGE
DIRECTOR OF PLANNING
69-825 HIGHWAY 111
RANCHO MIRAGE, CA 92270

CITY OF RIVERSIDE
DIRECTOR OF PLANNING
3900 MAIN STREET
RIVERSIDE, CA 92522

CITY OF SAN JACINTO
PLANNING DIRECTOR
P.O. BOX 488
SAN JACINTO, CA 92383

REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN
73-271 HIGHWAY 111, SUITE 21
PALM DESERT, CA. 92260

COUNTY OF RIVERSIDE
PLANNING DIRECTOR
4080 LEMON STREET, 9TH FLOOR
RIVERSIDE, CA 92501

REGIONAL WATER QUALITY CONTROL BOARD
SANTA ANA REGION
6809 INDIANA AVENUE, SUITE 200
RIVERSIDE, CA. 92506

GOVERNMENT LIST ORANGE COUNTY

**CITY OF ANAHEIM
PLANNING DEPT.
P.O. BOX 3222
ANAHEIM, CA 92803**

**CITY OF BUENA PARK
DIRECTOR OF PLANNING & BLDG.
6650 BEACH BLVD.
BUENA PARK, CA 90621**

**CITY OF COSTA MESA
DIRECTOR OF DEVELOPMENT SERVICES
P.O. BOX 1200
COSTA MESA, CA 92628**

**CITY OF FOUNTAIN VALLEY
PLANNING DIRECTOR
10200 SLATER AVE.
FOUNTAIN VALLEY, CA 92708**

**CITY OF FULLERTON
DIRECTOR OF DEVELOPMENT SERVICES
303 WEST COMMONWEALTH AVE.
FULLERTON, CA 92632**

**CITY OF GARDEN GROVE
DEVELOPMENT SERVICES DIRECTOR
11391 ACACIA PARKWAY
GARDEN GROVE, CA 92640**

**CITY OF HUNTINGTON BEACH
DIRECTOR OF DEVELOPMENT SERVICES
P.O. BOX 190
HUNTINGTON BEACH, CA 92648**

**CITY OF IRVINE
DIRECTOR OF COMMUNITY DEVELOPMENT
P.O. BOX 19575
IRVINE, CA 92713**

**CITY OF LA PALMA
CITY ENGINEER
7822 WALKER STREET
LA PALMA, CA 90623**

**CITY OF LOS ALAMITOS
DIRECTOR OF PUBLIC SERVICES
3191 KATELLA AVE.
LOS ALAMITOS, CA 90720**

**CITY OF NEWPORT BEACH
DIRECTOR OF PLANNING
3300 NEWPORT BLVD.
NEWPORT BEACH, CA 92663**

**CITY OF ORANGE
DIRECTOR OF PLANNING AND
DEVELOPMENT SERVICES
300 EAST CHAPMAN AVE.
ORANGE, CA 92666**

**CITY OF PLACENTIA
DIRECTOR OF DEVELOPMENT SERVICES
401 EAST CHAPMAN AVE.
PLACENTIA, CA 92670**

**CITY OF SAN CLEMENTE
COMMUNITY DEVELOPMENT DIRECTOR
100 AVENIDA PRESIDIO
SAN CLEMENTE, CA 92672**

**CITY OF SANTA ANA
PLANNING DIRECTOR
20 CIVIC CENTER PLAZA
SANTA ANA, CA 92701**

**CITY OF SEAL BEACH
DIRECTOR OF PLANNING
211 EIGHTH STREET
SEAL BEACH, CA 90401**

**CITY OF STANTON
COMMUNITY DEVELOPMENT DIR.
10660 WESTERN AVENUE
STANTON, CA 90680**

**CITY OF TUSTIN
COMMUNITY DEVELOPMENT DIRECTOR
300 CENTENNIAL WAY
TUSTIN, CA 92680**

**CITY OF VILLA PARK
CITY MANAGER
17855 SANTIAGO BLVD.
VILLA PARK, CA 92667**

**CITY OF WESTMINISTER
PLANNING DIRECTOR
8200 WESTMINISTER AVENUE
WESTMINISTER, CA 92683**

**CITY OF YORBA LINDA
COMMUNITY DEVELOPMENT DIRECTOR
P.O. BOX 487
YORBA LINDA, CA 9268**

**COUNTY OF ORANGE
ENVIRONMENTAL MANAGEMENT AGENCY
P.O. BOX 4048
SANTA ANA, CA 92702-4044**

**COUNTY OF ORANGE
DIRECTOR, EMA
12 CIVIC CENTER PLAZA
SANTA ANA, CA 92702**

**COUNTY OF ORANGE
ORANGE COUNTY ADMIN. OFFICER
10 CIVIC CENTER PLACE
SANTA ANA, CA 92701**

**ORANGE CO. TRANSPORT
P.O. BOX 4048
SANTA ANA, CA 92702-4048**

GOVERNMENT LIST SAN BERNADINO

CITY OF CHINO
PLANNING DIVISION
P.O. BOX 667
CHINO, CA 91708

CITY OF COLTON
DIRECTOR OF PLANNING
650 NORTH LA CADENA DRIVE
COLTON, CA 92324

CITY OF FONTANA
DIRECTOR OF PLANNING
8353 SIERRA AVE.
FONTANA, CA 92335

CITY OF GRAND TERRACE
PLANNING DIRECTOR
22795 BARTON RD.
GRAND TERRACE, CA 92324

CITY OF LOMA LINDA
DIRECTOR OF PLANNING
11128 ANDERSON STREET
LOMA LINDA, CA 92354

CITY OF MONTCLAIR
DIRECTOR OF COMMUNITY DEVELOPMENT
511 BENITO STREET
MONTCLAIR, CA 91763

CITY OF ONTARIO
CITY PLANNER
303 EAST "B" STREET
ONTARIO, CA 91764

CITY OF RANCHO CUCAMONGA
COMMUNITY DEVELOPMENT DIRECTOR
9320 BASE LINE ROAD, STE. C
RANCHO CUCAMONGA, CA 91701

CITY OF REDLANDS
PLANNING DIRECTOR
30 CAJON STREET
REDLANDS, CA 92373

CITY OF RIALTO
DIRECTOR OF PLANNING
150 SOUTH PALM AVE.
RIALTO, CA 92376

CITY OF SAN BERNADINO
DIRECTOR OF PLANNING
300 NORTH "D" STREET
SAN BERNADINO, CA 92418

CITY OF UPLAND
DIRECTOR OF PLANNING
460 EUCLID AVENUE
UPLAND, CA 91786

COUNTY OF SAN BERNARDINO
SAN BERNARDINO CO. ADMIN. OFFICER
385 N. ARROWHEAD AVE.
SAN BERNARDINO, CA 92415

COUNTY OF SAN BERNARDINO
ADMINISTRATOR, ENVIRONMENTAL PUBLIC WORKS
825 EAST THIRD STREET
SAN BERNARDINO, CA 92415

JOHN P BECKER
1291 E HILLSDALE BLVD SUITE 217
FOSTER CITY, CA 94404

GLADYS MEADE
AMERICAN LUNG ASSOCIATION OF CALIFORNIA
P.O. BOX 7000-866
REDONDO BEACH, CA 90277

RANDY NICHOLS
12900 CROSSROADS PKWY SUITE 200
INDUSTRY, CA 91746-3499

DENNIS W. MILLER
24651 KINGS ROAD
LAGUNA NIGUEL, CA 92677

MS MICHELE GRUMET
2036 W 77TH ST
LOS ANGELES, CA 90047

MR BRADLEY ANGEL
GREENPEACE
FORT MASON BUILDING E
SAN FRANCISCO, CA 94123

SUSAN DURBIN
3580 WILSHIRE BLVD
SUITE 600
LOS ANGELES, CA 90010

DIAN M. GRUENEICH
380 HAYES ST., SUITE FOUR
SAN FRANCISCO, CA 94102

CITIZENS FOR A BETTER ENVIRONMENT
971 N LA CIENEGA BL #204
LOS ANGELES, CA 90069-4709

SUSAN NELSON
1675 SARGENT PL
LOS ANGELES, CA 90026

MARK ABRAMOWITZ
750 MARINE ST #C
SANTA MONICA, CA 90405

COALITION FOR CLEAN AIR
ATTN MARK ABRAMOWITZ
309 SANTA MONICA BL #212
SANTA MONICA, CA 90401

HACIENDA HEIGHTS IMPROVEMENT ASSOCIATION
ATTN MR WILL BACA
PO BOX 5235
HACIENDA HEIGHTS, CA 91745

CONCERNED CITIZENS FOR
LOCAL JOBS COMMITTEE
P.O. BOX 3528
GARDENA, CA 90247-7228

GARY MOHART
P.O. BOX 3528
GARDENA, CA 90247

JO ANNE H. APLET
1101 CHAUTAUQUA BLVD.
PACIFIC PALISADES, CA 90272

PUBLIC AGENCIES LIST

AIR RESOURCES BOARD
PO BOX 2815
SACRAMENTO, CA 95814

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET
SAN FRANCISCO, CA 94109

CALIFORNIA ENERGY COMMISSION
1516 9TH ST ROOM 200
SACRAMENTO, CA 95814

CALIFORNIA WASTE MANAGEMENT BOARD
1020 NINTH STREET ROOM 300
SACRAMENTO, CA 95814

CALTRANS, DISTRICT 8
247 WEST THIRD ST.
SAN BERNARDINO, CA 92403

CALTRANS, DISTRICT 7
120 S SPRING STREET
LOS ANGELES, CA 90012

CALTRANS
PO BOX 942871
SACRAMENTO, CA 94274-0001

CEC ENVIRONMENT DIVISION
1516 NINTH STREET
SACRAMENTO, CA 95814

DEPARTMENT OF FISH AND GAME
REGIONAL MANAGER
245 W BROADWAY, SUITE 350
LONG BEACH, CA 90802

DEPT OF ENG. CONSTRUCTION DIVISION
ATTN: GEOLOGY AND SOIL ENG.
ROOM 860 CHE
200 N. MAIN STREET
LOS ANGELES, CA 90012

DEPT OF PUBLIC WASTE SYSTEMS
ENG. DIVISION
ROOM 650 CHE
200 N. MAIN STREET
LOS ANGELES, CA. 90012

DEPT OF PUBLIC WASTEWATER SYSTEMS
ENG. DIVISION
ROOM 650 CAG
200 N. MAIN STREET
LOS ANGELES, CA 90012

DEPT. OF HEALTH
714 P STREET RM 1253
SACRAMENTO, CA 95814

DEPT. OF WATER RESOURCES
1416 NINTH STREET
ROOM 215-4
SACRAMENTO, CA 95824

DGS/OEA
ATTN MARSHALL CLARK
915 CAPITOL MALL ROOM 402
SACRAMENTO, CA 95814

ENVIRONMENTAL MANAGEMENT BUREAU
1 WORLD WAY
LOS ANGELES, CA 90009

EPA
ATTN DAVID HOWECAMP
215 FREMONT
SAN FRANCISCO, CA 94105

L.A. DEPT. OF AIRPORTS
ONE WORLD WAY
LOS ANGELES, CA 90009

MARINE RESOURCES REGION
245 W BROADWAY SUITE 350
LONG BEACH, CA 90802

METROPOLITAN WATER DISTRICT OF SO CAL
ATTN: KATHLEEN M KUNYSZ
PO BOX 54153
LOS ANGELES, CA 90054

OPR
ATTN: KEITH LEE
1400 TENTH STREET
SACRAMENTO, CA 95814

PORT OF LA
425 S PALOS VERDES ST
PO BOX 151
SAN PEDRO, CA 90733-0151

PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102

REGIONAL WATER CONTROL BOARD
COLORADO RIVER BASIN REGION (7)
73 271 HIGHWAY 111, SUITE 21
PALM DESERT, CA 92260

REGIONAL WATER CONTROL BOARD
SANTA ANA REGION (8)
9771 CLAIREMONT MESA BLVD, SUITE B
SAN DIEGO, CA 92124-1331

REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION (4)
107 S BROADWAY ROOM 4027
LOS ANGELES, CA 90012

REGIONAL WATER QUALITY CONTROL BOARD
VICTORVILLE BRANCH OFFICE
15371 BONANZA ROAD
VICTORVILLE, CA 93292-2494

REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION (9)
9771 CLAIREMONT MESA BLD
SUITE B
SAN DIEGO, CA 92124-1331

SAN DIEGO AIR POLLUTION CONTROL DISTRICT
9150 CHESAPEAKE DRIVE
SAN DIEGO, CA 92123-1095

SCAG
600 S COMMONWEALTH AVE
LOS ANGELES, CA 90005

SOURCE REDUCTION RESEARCH PARTNERSHIP
ATTN RICHARD HOLLAND
PO BOX 54153
LOS ANGELES, CA 90054

SOURCE REDUCTION RESEARCH PARTNERSHIP
ATTN DR KATHLEEN WOLF
PO BOX 54153
LOS ANGELES, CA 90054

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION
SITING AND ENVIRONMENTAL DIVISION
1516 9TH STREET, MS-40
SACRAMENTO, CA 95814

STATE OF CALIFORNIA
RESOURCE AGENCY
1416 9TH STREET
SACRAMENTO, CA 95814

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
1416 9TH ST ROOM 1325 2
SACRAMENTO, CA 95814

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES
TOXIC SUBSTANCE CONTROL DIVISION
107 S BROADWAY ROOM 7011
LOS ANGELES, CA 90012

STATE OF CALIFORNIA
ATTORNEY GENERAL OFFICE
3580 WILSHIRE BLVD STE 600
LOS ANGELES, CA 90010

STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER QUALITY
P O BOX 100
SACRAMENTO, CA 95801

US ARMY CORPS OF ENGINEERS
ATTN CESPL-PD-RP
PO BOX 2711
LOS ANGELES, CA 90053

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